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THE
ANDERSON ARITHMETIC

BOOK ONE

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PREFACE

In the preparation of this series of arithmetics the author has utilized not only the conclusions reached by his own study and investigations and by his experience of many years in teaching and supervising the teaching of arithmetic, but also the results of modern school practice, experiments, and investigations contributed by many who have labored in this field to discover the inherent difficulties of the subject itself, to improve methods of instruction, and to eliminate useless subject matter. An examination of these books will reveal their adaptation to modern courses of study and methods of instruction.

Book One, the first of the series, covers the work of the first four years. It provides a carefully organized subject matter for these years, which, if properly taught, will lead to skill in the use of fundamental processes, simple measures, and easy fractions. At the same time, it is suited to the child's capacity and will stimulate rather than inhibit his interest in the subject.

The book begins by utilizing the fund of unorganized arithmetical knowledge which the child possesses on entering school and proceeds by easy and carefully graded stages, with abundant drill, to the development of the subject within the assigned limits.

It is sometimes thought that the mastery of the elementary sums, differences, products, and quotients is easy of accomplishment, but recent and extensive investigations show this view to be erroneous. It is believed that this book places proper emphasis on these subjects by its abundant drill upon all, and upon the more difficult parts of each, in particular reviews, tests, and checks.

The presentation of addition, subtraction, multiplication, and division; the exercises to teach thrift, order, and neatness; and the abundance of problems, are all in harmony with the best school practice.

Chapter I, while intended for use in reviewing what has been given the pupil informally as oral exercises during the first two years, is, in reality, more than a review; it is a systematic presentation of the work usually done in these two years. In addition to furnishing the necessary content, the arrangement of this material is so sound that its use page after page through the chapter will be accompanied by a steady and intelligent progress on the part of the pupil. Heretofore, the work of gathering and organizing the necessary arithmetic material for these two grades has usually devolved upon the teacher. This chapter will relieve her of this work.

Chapter II, which is intended for the third year, makes provision for the pupil to master the elementary facts of addition and subtraction; to become proficient in the processes of written addition and written subtraction; to master the elementary facts of multiplication, division, and simple measures; and to become proficient in the processes of written multiplication and short division. It also furnishes the fullest opportunity for the application of the processes learned to the solution of suitable problems.

Chapter III is planned to meet the usual demands for the work of the fourth year. After providing for a thorough review of addition, subtraction, and multiplication, it places emphasis on long division, easy fractions, and measures, and closes with an extensive general review covering a variety of problems which are in every sense up-to-date and suitable for the grade.

R. F. A.

CONTENTS

CHAPTER I

PAGE
COUNTING; READING NUMBERS 1
COUNTING; READING AND WRITING NUMBERS 2
ADDITION 4
  Elementary Sums 4
  Playing Store 5
  Use of + and = ... 7
  Elementary Sums to 9 10
SUBTRACTION 12
THE TENS 17
NUMBERS BETWEEN TEN AND TWENTY 19
NUMBERS BETWEEN THE TENS 21
REVIEW 23
ADDITION 25
  Two Numbers of One Figure Each; Sum, 10 or More 25
  Combinations of More than Two Numbers of One Figure Each . 27
SUBTRACTION 28
  A Number of One Figure from a Number of Two Figures . . . 28
REVIEW 30
FORMING, READING, AND WRITING NUMBERS 31
  Numbers of Three Figures Each 31
ADDITION 34
  A Number of One Figure to a Number of Two Figures; Sum of the Units, Less than 10 34
  Numbers Involved: Less than 100; Sum of the Numbers in Each Column, Less than 10 35
  A Number of One Figure to a Number of Two Figures; Sum of the Units, 10 or More 38
  Numbers Involved: Less than 100; Sum of the Units, 10 or More 39

PAGE
SUBTRACTION 41
Numbers Involved, Less than 100; the Lower Number in Each Column Less than the Upper 41
Numbers Involved, Less than 100; the Lower Number in Units' Column Greater than the Upper 43
THRIFT 45
REVIEW 46
MULTIPLICATION AND DIVISION 49
Multiplying by 2 49
Dividing by 2 51
Multiplying by 3 52
Dividing by 3 54
Multiplying by 4 55
Dividing by 4 57
Multiplying by 5 58
Dividing by 5 59
LIQUID MEASURES 60
DRY MEASURES 62
MEASURES OF LENGTH 64
ROMAN NOTATION 66
TELLING TIME 67
REVIEW 69

CHAPTER II

READING AND WRITING NUMBERS 70
Numbers of Four Figures Each 71
ADDITION AND SUBTRACTION 72
The Forty-five Elementary Sums 72
Eighty Important Elementary Differences 72
ADDITION 73
A Number of One Figure to a Number of Two Figures . . . 73
Combinations of More than Two Numbers of One Figure Each . 74
The Sum in Any Column, Less than 10 75
The Sum in Any Column not Restricted 76
SUBTRACTION 79
A Number of One Figure from a Number of Two Figures . . 79
The Lower Number in Each Column Less than the Upper . . 80

PAGE

The Lower Number in One Column, or More than One Column, Greater than the Upper . . . 81
ROMAN SYSTEM . . . 84
UNITED STATES MONEY . . . 85
Addition . . . 87
Subtraction . . . 88
Making Change . . . 89
DIRECTION . . . 90
REVIEW . . . 91
MULTIPLICATION — MULTIPLYING BY 2 AND BY 3 . . . 92
Multiplying Numbers of Two and Three Figures by 2 and by 3 . . . 95
DIVISION — DIVIDING BY 2 AND BY 3 . . . 96
Dividing Numbers of Two and Three Figures by 2 and by 3 . . . 98
REVIEW . . . 99
TIME . . . 100
Telling Time . . . 100
Noon, Forenoon, Afternoon . . . 102
The Calendar . . . 103
WEATHER CONDITIONS . . . 104
MULTIPLICATION . . . 105
Multiplying by 4 and by 5 . . . 105
Multiplying Numbers of Two and Three Figures by 2, 3, 4, and 5 . . . 108
DIVISION . . . 110
Dividing by 4 and by 5 . . . 110
Division with Remainders . . . 112
Dividing Numbers of Two or Three Figures by 2, 3, 4, and 5 . . . 113
REVIEW . . . 115
LIQUID MEASURES . . . 120
DRY MEASURES . . . 121
MEASURES OF WEIGHT . . . 123
MEASURES OF LENGTH . . . 124
THE SQUARE . . . 126
THE RECTANGLE . . . 128
ADDITION: REVIEW AND PRACTICE . . . 130
SUBTRACTION: REVIEW AND PRACTICE . . . 131
ADDITION AND SUBTRACTION: UNITED STATES MONEY . . . 132

PAGE
REVIEW 133

MULTIPLICATION AND DIVISION 135
  Multiplying by 6 135
  Dividing by 6 136
  Multiplying by 7 137
  Dividing by 7 138
  Multiplying by 8 141
  Dividing by 8 142
  Multiplying by 9 143
  Dividing by 9 144
  Review and Practice 147

THRIFT 151

DIVISION — RESULTS NOT WHOLE NUMBERS 152
  Dividing by 2 152
  Dividing by 3 153
  Dividing by 4 154
  Dividing by 6 155
  Dividing by 8 156
  Review and Practice 157

MULTIPLICATION 159
  Multiplying by 10 and 100 159
  Multiplying by Numbers ending in 0 161

DIVISION 162
  Dividing by 10 and 100 162
  Dividing by Numbers ending in 0 163

MULTIPLICATION — MULTIPLYING BY 11 AND BY 12 164

MULTIPLICATION TABLES 165

REVIEW 166

MULTIPLICATION — MULTIPLYING BY ANY NUMBER OF TWO FIGURES 167

GENERAL REVIEW 168

CHAPTER III

READING AND WRITING NUMBERS 172
  Roman Notation 175

ADDITION 177

SUBTRACTION 180

PAGE
MULTIPLICATION 183
DIVISION 190
Dividing by Numbers of Two Figures Each; Quotient, a Number of One Figure 192
Quotient, a Number of More than One Figure 196
REVIEW 201
FRACTIONS 205
Halves, Fourths, Eighths, and Sixteenths 206
Adding Easy Fractions 207
Subtraction 212
Halves, Thirds, and Sixths 214
Halves, Fifths, and Tenths 216
Multiplication 219
Finding Parts of a Number 220
Multiplication 221
Comparison 222
Review 223
UNITED STATES MONEY 227
Thrift 238
REVIEW 239
BILLS 242
MEASURES 244
Measures of Time 244
Measures of Length 247
Drawing to a Scale 248
Angles and Measures of Surface 249
Angles and the Square 249
The Rectangle 252
Plan of a Garden 253
The Cube 254
The Rectangular Solid 257
Measures of Weight 258
Counting 260
GENERAL REVIEW 261
REFERENCE TABLES 273

SUGGESTIONS TO TEACHERS

Definite Aims. On beginning the work of each grade there should be a full realization on the part of the teacher of the exact amount of work to be accomplished in that grade, together with a definite plan for securing the desired results with the greatest economy of time and effort. In each grade there are one or more topics which should be strongly emphasized, to the end that the pupil may acquire each year a more or less complete mastery of a definite portion of the subject. In the elementary grades these topics are:

First Grade:	Counting, reading and writing numbers, elementary sums and differences.
Second Grade:	Addition and subtraction.
Third Grade:	Multiplication and short division.
Fourth Grade:	Long division.

Counting, Reading and Writing Numbers. The pupil should be taught not only to count by 1's forwards and backwards, but also by 2's, 3's, and so on, beginning at different numbers. See pages 3, 17, 20, 70, 79, 115, 135. He should also be taught the composition of numbers and the place values of the various digits, since an understanding of these values is an indispensable foundation for intelligent work in addition, subtraction, multiplication, and division. See pages 17, 19, 21, 31, 33 (examples 19 to 25). Much of the difficulty encountered later in decimals is due to the pupil's failure to understand the significance of place value in our system of notation.

Addition and Subtraction. In the first two grades the mastery of the elementary sums and differences should be the chief aim. By the close of the third year these should be known so well that the pupil can name any one of those on page 72 without hesitation. Even beyond the third grade these elementary sums and differences should be reviewed in order that a high standard of accuracy and speed may at all times be maintained.

Multiplication and Short Division. During the third year the multiplication tables should be mastered and sufficient drill in their application provided so that little, if any, further review will be necessary. The pupil's knowledge of them should be tested by such reviews as that on page 94. If the pupil is required to build these tables for himself (see pages 49, 52, 55, 58, 135), learning them will cease to be purely a memory exercise and will become an intelligent process. It has been found by investigation that some of the products in the multiplication tables are more difficult of mastery than others; these products are to be found on page 166 for special review and drill. Short division is so closely associated with the simpler phases of multiplication work that the teaching of the two ought to be closely related. Unsatisfactory results in short division have usually resulted from failure to drill sufficiently on such examples as numbers 2 to 11, page 136. See *To the Teacher*, page 144.

Long Division. The unsatisfactory progress in long division so frequently evident at the close of the fourth year is due largely to faulty presentation of the subject at the very outset; *i.e.* much time is lost, and the pupil's interest in the subject consequently dulled, (1) because the numbers employed in the earliest exercises are too large, and (2) because sufficient emphasis is not placed on the *process*. The child is confronted with two difficulties at the same time: the one, the difficulty of ascertaining the right quotient figure with a large divisor employed, and the other, unfamiliarity with the process. These difficulties are obviated by teaching the pupil first the *process* of long division, that is, teaching him *what is the next thing to do.* This can best be done by associating long division with short division and by the use of a divisor with which he is familiar. See page 191. Then, after the pupil is familiar with the process, his progress should be rapid and sure if he is given much practice in estimating the proper quotient figure. See pages 192, 193, 194, 196, 197, 198, 199.

Tests. All time records mentioned in this book (as on pages 72, 177, 178, 179) have been fixed by actual trials of these exercises in the grades for which they were prepared. Owing to the allowance that must be made for individual differences in children, no hard and fast standard of speed and accuracy can be fixed; nevertheless, it is reasonable to expect the pupil to master these sums and differences so well that he can name them at sight. The purpose of the timing is to insure concentration and efficient habits of work; it should not, of course, be carried to the extent of making the pupils nervous and hurried. Moreover, the exercise should not be prolonged until the class tires, for with the entry of the fatigue element, there is a consequent opportunity for errors to occur which it will take hours of careful drill to overcome.

Dramatization. The well-known tendency of children to act out make-believe situations, involving either their own games and other activities or the occupations of older people, may be utilized to good advantage, especially in these elementary grades. See *To the Teacher*, page 5.

Motivation. The study of numbers is one in which the pupil soon becomes conscious of a certain power, and this very consciousness is in itself sufficient to impel him to persevere for the mastery of each new phase of the subject. In the early stages of learning each process, the pupil must be taught the *how* of it and assisted to the point from which he can go forward unaided; then the realization that he possesses the power to work independently, and his desire to demonstrate this power in competition with others, are oftentimes sufficient to sustain his interest until he gains the mastery desired. It is possible, however, to motivate still further the number work of the lower grades, especially drill work on the fundamental processes. Games in which an accurate knowledge of elementary number combinations is essential to success, provide one of the best means of motivating primary number work. Problem material should be based, as far as possible, on the child's own activities and interests, and those of home, school, and community. The actual problems of buying groceries and dry goods, of keeping monthly cash accounts (emphasizing at the same time the thrift element), and problems correlating gardening, manual training, and other elementary grade subjects should be utilized; and to these should be added imaginary problems involving situations within the bounds of the child's own experience.

Oral Work. During the first four years oral work should prevail. The pupil should be encouraged to solve problems orally when he can do so; but, since some children are able to solve orally problems which others of the same grade cannot solve in this manner, the best practice is to require each pupil to perform the work orally to the extent of his individual ability. During these years there should be little attempted in the way of formal written solutions.

Recent studies and investigations have shown that the fundamental processes of arithmetic, such as addition, are very complex and consequently difficult for children. Teachers who are interested should consult "Investigations in Arithmetic," by E. R. Wood, Principal Model High School, Lexington, Ky., and "The Relative Difficulty of the Elementary Number Combinations in Addition and Multiplication" by H. V. Holloway, Dover, Delaware.

BOOK ONE

CHAPTER I

Counting; Reading Numbers

1. Exercise:

1. Count *one*, *two*, and so on to *five*.

2. Count *one*, *two*, *three*, and so on to *nine*.

3. Count as far as you can.

4. With your pencil make *one* stroke. Make *two* strokes as you count *one*, *two*. Make *three* strokes as you count *one*, *two*, *three*. Make *four* strokes as you count *four*. Continue until you have made *nine* strokes as you count *nine*.

5. Take *three* steps as you count *three*; *four* steps as you count *four*; and so on until you have taken *nine* steps as you count *nine*.

6. Read aloud:

1 2 3 4 5 6 7 8 9

7. Point to the right figures as you say, *one*, *two*, *three*, *four*, *five*, *six*, *seven*, *eight*, *nine*.

8. Point to the right figure as you say, *four*; *one*; *two*; *six*; *nine*; *five*; *three*; *eight*; *seven*.

9. Copy carefully the figures in example 6. Study the form of each carefully so that you will always know its name and be able to make it.

2. Exercise:

Name the figures in this row: 2, 1, 3, 4, 6, 5, 8, 7, 9.

Name the figures in this row: 4, 2, 9, 5, 7, 3, 8, 1, 6.

What number comes next after five? next before five?

What number comes next before six? next after six?

What number comes next before seven? next after seven? next before eight? next after eight?

What number is one more than 2? one more than 3? one more than 4? one more than 5? one more than 6? one more than 7? one more than 8?

Read these numbers from left to right beginning with 1; from right to left beginning with 9; to the right from 4; to the left from 5:

1 2 3 4 5 6 7 8 9

Write the figure that stands for eight; four; two; six; three; nine; one; five; seven.

Read the numbers in the top row of this square.

Read the numbers in the middle row.

Read the numbers in the bottom row.

Begin at the top row and read each row from right to left.

Read the columns from top to bottom.

Read the columns from bottom to top.

8	6	3
2	4	7
1	9	5

Name four things that are green.

Name two things that are cold.

Name four things that we can see by looking up.

Name five things that are round.

3. Exercise:

Write 1, 2, 3, 4, and so on as far as you can.

Count backwards from four to one; five to one; six to one; seven to one; eight to one; nine to one.

Find page 8 of this book; page 9; page 6; page 5.

Read these numbers, speaking louder when you name one written in black figures: 1, **2**, 3, **4**, 5, **6**, 7, **8**.

Make the figure 7 eight times; make 8 nine times.

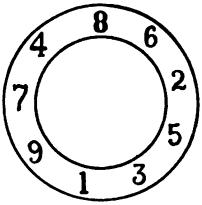
Write in a column 1, 2, and so on to 9. Write in a column 9, 8, and so on to 1.

Point to your right; to your left; up; down. How many times did you point?

Point to your right knee; to your left knee; to your right eye; to your left eye; to your left ear; to your right ear. How many times did you point?

How many years old are you?

Read the numbers in this ring, beginning at 1; read around first to the left, then to the right.



Begin at 3 and read each way; at 8.

Begin at 9 and read each way; at 6.

Read: 2, 4, 6, 8; then 8, 6, 4, 2.

Name all the colors that you know, and make a stroke for each color; how many did you make?

Name all the kinds of birds that you know, and make a stroke for each kind; how many did you make?

Name six things that you would like to have for Christmas.

Name five things that grow on trees.

Elementary Sums

4. Exercise:

To the Teacher. In drilling upon these combinations a variety of objects, sounds, and motions should be used.

How many are:

1 and 1 ?
2 ones ?
2 and 1 ?
1 and 2 ?
3 and 1 ?
1 and 3 ?
2 and 2 ?
2 twos ?
4 and 1 ?
1 and 4 ?
3 and 2 ?
2 and 3 ?

Say the right number after *are:*

1 and 1 are —
2 and 1 are —
3 and 1 are —
2 and 2 are —
4 and 1 are —
3 and 2 are —
2 ones are —
1 and 2 are —
1 and 3 are —
2 twos are —
1 and 4 are —
2 and 3 are —

Clara's doll has 2 white dresses and 1 pink dress; how many of both kinds has she?

One mother bird and 3 baby birds are how many birds?

In Grace's toy village there are 4 small houses and 1 large one; how many are there of both kinds?

Two Christmas bells and 3 Christmas bells are how many Christmas bells?

Joe's baby sister has 3 upper teeth and 2 lower ones; how many teeth has she?

Don learned 2 new words yesterday and 2 more to-day; how many did he learn both days?

Playing Store

Play that you are keeping store and that your prices are:

Lily Tart,	1 cent
Chocolate Bar,	1 cent
Chocolate Bud,	2 cents
Caramel,	2 cents
Apple,	3 cents
Orange,	4 cents

5. Exercise:

How many cents would you charge for:

1. 2 lily tarts? 2. 2 caramels?
3. A caramel and a lily tart?
4. A chocolate bar and a caramel?
5. An apple and a lily tart?
6. A chocolate bar and an apple?
7. An orange and a lily tart?
8. A chocolate bar and an orange?
9. An apple and a caramel?
10. A chocolate bud and an apple?

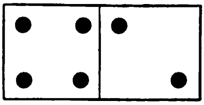
To the Teacher. Acting out such make-believe situations as "Keeping Store," "Fishing," "Keeping a Lemonade Stand," and "Climbing a Ladder," or the dramatization of nursery rimes, games, and other activities may be introduced in number work from time to time, but they should not be used to displace the real work to any extent. Children's interest in real number work is usually keen and sustained so long as they are making progress. The danger of mistaking the means for the end should be guarded against in dramatizing. It may be employed to advantage in giving the pupil assurance in the use of what he knows, or in stimulating lagging interest.

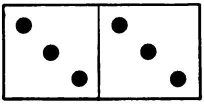
6. Exercise:

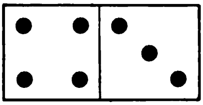
How many are:

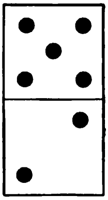
5 and 1 ? 1 and 5 ? 7 and 1 ? 1 and 7 ?
6 and 1 ? 1 and 6 ? 8 and 1 ? 1 and 8 ?

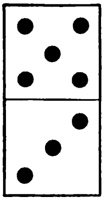
How many dots are there on the first domino? How many are there on each of the other dominoes?

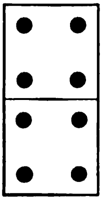


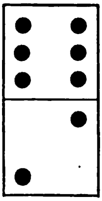


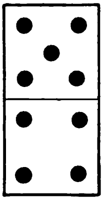












7. Exercise:

To the Teacher. See "To the Teacher," page 4.

How many are:

1. 2 and 3? 3 and 1? 2 and 2? 1 and 5?
2. 3 and 3? 1 and 6? 4 and 3? 1 and 7?
3. 3 and 4? 6 and 2? 3 and 5? 8 and 1?
4. 2 and 7? 5 and 4? 5 and 1? 2 and 4?
5. 5 and 3? 2 fours? 7 and 2? 3 and 6?
6. 3 and 2? 4 and 2? 2 threes? 5 and 2?
7. 6 and 1? 2 and 5? 7 and 1? 2 and 6?
8. 4 and 4? 1 and 8? 6 and 3? 4 and 5?

Use of + and =

8. *3 and 2 are 5* may be written $3+2=5$.
The sign + stands for **and.**
The sign = stands for **are** or **is.**
Not any marbles may be written *0 marbles.*
Zero is a name for **0.**

9. Exercise:

Read:

$4+2=6$ $4+4=8$ $5+0=5$ $5+4=9$

4 flags + 3 flags = 7 flags.
3 cents + 1 cent = 4 cents.
6 pens + 0 pens = 6 pens
5 pears + 2 pears = 7 pears.

10. Putting 2 and 3 together to make one number, *five*, is **adding** 2 and 3. *Five* is called the **sum** of 2 and 3.

11. Exercise:

Copy, writing the proper figure after each = sign:

$1+1=$
$2+1=$
$1+2=$
$3+1=$
$1+3=$
$2+2=$
$4+1=$
$1+4=$
$3+2=$

$2+3=$
$5+1=$
$1+5=$
$4+2=$
$2+4=$
$3+3=$
$6+1=$
$1+6=$
$5+2=$

$2+5=$
$4+3=$
$3+4=$
$7+1=$
$1+7=$
$6+2=$
$2+6=$
$5+3=$
$3+5=$

$4+4=$
$8+1=$
$1+8=$
$7+2=$
$2+7=$
$6+3=$
$3+6=$
$5+4=$
$4+5=$

Look at each pair of numbers and try to say the right number after =, reading from left to right; reading down the columns; reading up the columns.

12. Exercise:

1. Try to tell at sight the sum of each pair of numbers:

3 + 2 5 + 3 7 + 2 4 + 5 3 + 4 5 + 2
2 + 7 4 + 2 3 + 3 4 + 4 6 + 3 5 + 4

2. Say the right number where the — is:

1 marble + 1 marble = — marbles.
3 cents + 2 cents = — cents.
4 dolls + 1 doll = — dolls.
5 flags + 2 flags = — flags.
3 cards + 4 cards = — cards.
4 lamps + 5 lamps = — lamps.

3. How many letters are there in *Jack?* in *Jill?* in both words? Can you tell the story of Jack and Jill?

4. Jane has 2 sisters and 3 brothers; how many of both has she?

5. How many sheep are 5 sheep and 2 sheep? Can you tell a story of a little girl and her sheep?

6. How many mittens are 2 mittens and 2 mittens?

7. How many mittens are 4 mittens and 2 mittens? Can you tell the story of "The Three Little Kittens"?

8. Count the words in each of these two lines and tell how many there are in both:

Ding, dong, bell!
Pussy's in the well.

Can you say the rest of this rime?

SOMETHING HERE FOR GIRLS AND BOYS

Red Cross seal,	1 cent	Balloon,	5 cents
Picture post card,	1 cent	Toy hoe,	5 cents
Paper doll,	2 cents	Toy rake,	6 cents
Doll's dress,	2 cents	Toy telephone,	6 cents
Tin soldier,	3 cents	Dancing top,	7 cents
Toy dog,	3 cents	Tin dishes,	7 cents
Toy lantern,	4 cents	Toy hatchet,	8 cents
Christmas bell,	4 cents	Bird whistle,	8 cents

13. Exercise :

How much must you pay for :

1. A dancing top and a picture post card ?
2. A Red Cross seal and tin dishes ?
3. A toy hatchet and a picture post card ?
4. A Red Cross seal and a bird whistle ?
5. A doll's dress and a toy telephone ?
6. A paper doll and tin dishes ?
7. A tin soldier and a toy dog ?
8. A toy lantern and a tin soldier ?
9. A toy dog and a toy hoe ?
10. A toy dog and a toy rake ?
11. A toy lantern and a Christmas bell ?
12. A balloon and a toy lantern ?

What two things can you buy for :

13. 2 cents ? 14. 3 cents ? 15. 5 cents ? 16. 8 cents ?
17. 4 cents ? 18. 6 cents ? 19. 7 cents ? 20. 9 cents ?

Elementary Sums to 9

14. Exercise:

Copy, and write under each line the sum of the numbers above it:

$$\begin{array}{ccccccccc}
1 & 1 & 2 & 1 & 3 & 2 & 1 & 4 & 2 \\
\underline{1} & \underline{2} & \underline{1} & \underline{3} & \underline{1} & \underline{2} & \underline{4} & \underline{1} & \underline{3}
\end{array}$$

$$\begin{array}{ccccccccc}
3 & 1 & 5 & 4 & 2 & 3 & 6 & 1 & 5 \\
\underline{2} & \underline{5} & \underline{1} & \underline{2} & \underline{4} & \underline{3} & \underline{1} & \underline{6} & \underline{2}
\end{array}$$

$$\begin{array}{ccccccccc}
2 & 4 & 3 & 7 & 1 & 6 & 2 & 5 & 3 \\
\underline{5} & \underline{3} & \underline{4} & \underline{1} & \underline{7} & \underline{2} & \underline{6} & \underline{3} & \underline{5}
\end{array}$$

$$\begin{array}{ccccccccc}
4 & 8 & 1 & 7 & 2 & 6 & 3 & 5 & 4 \\
\underline{4} & \underline{1} & \underline{8} & \underline{2} & \underline{7} & \underline{3} & \underline{6} & \underline{4} & \underline{5}
\end{array}$$

To the Teacher. If duplicate combinations, such as $\begin{smallmatrix}1\\ \underline{2}\end{smallmatrix}$ and $\begin{smallmatrix}2\\ \underline{1}\end{smallmatrix}$ (both should be taught), be considered as one combination, the 36 examples above are comprised in the following 20, which should be drilled on until the pupil can give the sums at sight; for these are all the combinations there are of two numbers of one figure each in which the sum is 9 or less. Make application of them in his nursery rimes, games, and other activities.

Name at sight each sum:

$$\begin{array}{cccccccccc}
1 & 2 & 5 & 6 & 3 & 4 & 3 & 5 & 7 & 4 \\
\underline{1} & \underline{2} & \underline{2} & \underline{1} & \underline{3} & \underline{1} & \underline{2} & \underline{3} & \underline{1} & \underline{4}
\end{array}$$

$$\begin{array}{cccccccccc}
2 & 7 & 8 & 4 & 6 & 4 & 5 & 6 & 3 & 5 \\
\underline{1} & \underline{2} & \underline{1} & \underline{3} & \underline{3} & \underline{2} & \underline{1} & \underline{2} & \underline{1} & \underline{4}
\end{array}$$

15. Exercise:

Make 3 strokes, then 2 more; how many did you make?

4 lambs and 2 sheep are how many animals?

How many wheels have 2 wagons?

4 boys and 3 girls are how many children?

How much must I pay for a 4-cent tablet and a 2-cent pencil? for a 6-cent tablet and a 3-cent pencil?

How many roses are 6 red roses and 3 white ones?

Which is more, 4 and 3, or 6 and 2?

Tell quickly how many are:

2 and 6; 3 and 5; 4 and 4; 1 and 7; 5 and 4.

3 rows of corn and 1 row of beans are how many rows of both?

4 robins and 2 wrens are how many birds?

Name 5 girls; 4 boys; how many persons did you name?

Say *book* 4 times, then 3 more times; how many times did you say the word?

Name 3 things that are round, and 2 things that are not round; how many things did you name?

Name 2 animals that can climb and 2 that cannot climb; how many animals did you name?

Name 3 things that can fly and 5 that can run but cannot fly; how many things did you name?

Tell quickly how many are:

6 and 3; 5 and 4; 3 and 6; 3 and 4; 7 and 2; 4 and 5.

Draw a line and make 4 dots to the right of it and 5 dots to the left of it; how many dots did you make?

16. Exercise:

Helen had 5 cents and bought a 2-cent paper doll; how many cents had she left? 2 cents and how many cents are 5 cents?

$$2 + ? = 5$$

How many are 5 *less* 2?

17. *5 less 2 = 3* may be written *5 − 2 = 3*.

5 − 2 = 3 may also be read *5 minus 2 = 3*.

5 − 2 may also be written:

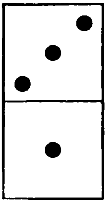
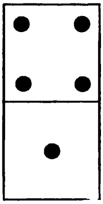
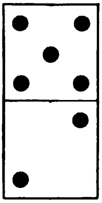
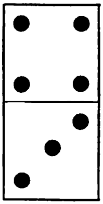
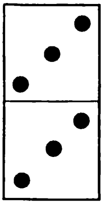
$$\begin{array}{r} 5 \\ -2 \\ \hline \end{array}$$

2 + 3 = 5	**5 − 2 = 3** **5 − 3 = 2**	$\begin{array}{r} 5 \\ -2 \\ \hline 3 \end{array}$	$\begin{array}{r} 5 \\ -3 \\ \hline 2 \end{array}$

1 less 1 is *not any*, and may be written *1 − 1 = 0*.

Read: 4 − 2 = 2. 6 − 3 = 3. 2 − 2 = 0.

7 cents − 5 cents = 2 cents.
8 sheep − 3 sheep = 5 sheep.

Study the first domino; see that: 3 + 1 = 4, that 4 − 1 = 3, and that 4 − 3 = 1. What can you find out by studying each of the other dominoes?

18. Taking 2 from 3 is called **subtracting** 2 from 3.

The number *one* left by taking 2 from 3 is called the **remainder** or their **difference.**

19. Exercise:

Look at each pair of numbers in example 1 and say the right number after =. Do the same with example 2, and then with each of the other examples:

	a	*b*	*c*	*d*	*e*	*f*
1.	2 + 1 =	3 − 1 =	3 − 2 =	3 + 1 =	4 − 1 =	4 − 3 =
2.	4 + 1 =	5 − 1 =	5 − 4 =	3 + 2 =	5 − 2 =	5 − 3 =
3.	5 + 1 =	6 − 1 =	6 − 5 =	4 + 2 =	6 − 2 =	6 − 4 =
4.	6 + 1 =	7 − 1 =	7 − 6 =	5 + 2 =	7 − 2 =	7 − 5 =
5.	4 + 3 =	7 − 3 =	7 − 4 =	7 + 1 =	8 − 1 =	8 − 7 =
6.	6 + 2 =	8 − 2 =	8 − 6 =	5 + 3 =	8 − 3 =	8 − 5 =
7.	8 + 1 =	9 − 1 =	9 − 8 =	7 + 2 =	9 − 2 =	9 − 7 =
8.	6 + 3 =	9 − 3 =	9 − 6 =	5 + 4 =	9 − 4 =	9 − 5 =

State at sight the sum of each pair of numbers in columns *a* and *d*. State the difference between each pair of numbers in columns *b*, *c*, *e*, and *f*.

9. How many are: 2 + 2? 4 − 2? 3 + 3? 6 − 3? 6 − 6? 3 − 3? 2 − 2? 2 − 1?

10. How many are: 4 + 4? 8 − 4? 5 − 5? 7 − 7? 1 − 1? 8 − 8? 9 − 9? 4 − 4?

11. Name the differences at sight:

7 − 5; 8 − 3; 9 − 6; 8 − 5; 9 − 3; 9 − 4; 7 − 3; 9 − 5.

20. **I** sometimes stands for *one*. **V** sometimes stands for *five*.

A V-cent piece is worth five cents. A five-cent piece is sometimes called a nickel.

To the Teacher. Toy money or real money may be used to advantage in teaching the minor units of value.

21. Exercise:

In examples 1–7, tell how many cents each has left:

1. Jane has 4 cents and spends 1 cent for a post card.

2. Frank has 9 cents and spends 6 cents for an ice cream cone.

3. Clara has 8 cents and spends 5 cents for jackstones.

4. Mary has a nickel and spends 2 cents for a chocolate bar.

5. James has 9 cents and spends 5 cents for a toy hoe.

6. John has 7 cents and spends a nickel for car fare.

7. Grace has 9 cents and spends 4 cents for Red Cross seals.

8. In May's toy village there are 8 houses; four are on one side of the street. How many are on the other side?

9. How much change should you get if you buy a 3-cent apple and give the storekeeper a nickel?

10. If you have 6 cents, how many more must you get to have 9 cents? 8 cents? 7 cents?

11. I must walk 9 blocks to school; how many have I yet to walk after I have walked 7 blocks? 4 blocks?

12. Eight girls were invited to Jean's tea party; 2 of them have not yet come, how many of them have come?

22. Exercise:

Copy, and write the differences:

1	2	2	3	3	3	4	4	4
1	1	2	1	2	3	1	3	2
4	5	5	5	5	5	6	6	6
4	1	4	2	3	5	1	5	2
6	6	6	7	7	7	7	7	7
4	3	6	1	6	2	5	3	4
7	8	8	8	8	8	8	8	8
7	1	7	2	6	3	5	4	8
9	9	9	9	9	9	9	9	9
1	8	2	7	3	6	4	5	9

To the Teacher. The *forty-five* examples above are all that can be made in which the subtraction of a number of one figure from a number of one figure is required. Drill on them until the pupil can name at sight any of the differences. Make application of this exercise to his various activities.

Here are some of the harder of the examples given above. Review these until you can give every difference at sight:

9	6	6	8	7	8	5	9	5
3	2	5	2	6	6	2	7	4
4	9	8	6	9	8	7	8	7
3	2	7	4	5	4	2	5	3
7	4	8	9	6	9	7	5	9
4	2	3	8	3	6	5	3	4

23. Exercise:

6 daisies are how many more than 4 daisies?

9 strokes are how many more than 6 strokes?

If you buy a 2-cent postage stamp, how much change should you get from a nickel?

A man has 5 horses; how many more must he buy to have 8 horses? to have 9 horses?

9 is how many more than 4? how many more than 5?

A boy had 8 rockets and shot off 4 of them; how many had he left?

A dealer had 8 colts and sold 3 of them; how many had he left? He had left how many more than he sold?

A farmer planted 9 trees but 5 of them died; how many lived? How many more died than lived?

A girl found 7 eggs and broke 3 of them; how many had she left? This was how many more than she broke?

Mary bought a 3-cent pencil and gave the storekeeper a nickel; how much change should he give her?

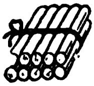
Jane was given 9 roses; 6 of them were white and the others red; how many were red?

7 days = 1 week

Last week two days were rainy, and the others were clear; how many were clear?

Sara went to her aunt's on Saturday to stay a week; she stayed 4 days; on what day did she leave her aunt's?

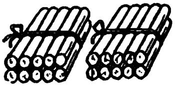
Forming, Reading, and Writing the Tens



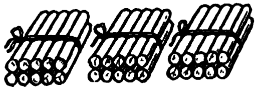
24. 1. Ten ones make **a ten.**

2. Ten is written **10**, which means **one** ten and **no** ones.

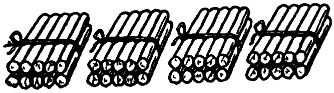
3. The figure **0** is called **naught, cipher**, or **zero.**



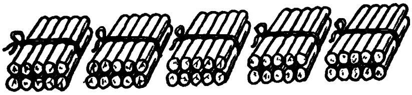
4. Two tens make **twenty**, written **20**.



5. Three tens make **thirty**, written **30**.



6. Four tens make **forty**, written **40**.



7. Five tens make **fifty**.

To THE TEACHER. Use counters in teaching the tens only until the process of forming the tens is understood. Soda straws make cheap, clean, and almost noiseless counters. They may be used, tied with rubber bands, to teach the tens. Have the pupil group the straws in tens.

8. Write the figures that stand for fifty.

9. Six tens make what? seven tens? eight tens? nine tens?

10. Write the figures that stand for six tens; seven tens; eight tens; nine tens.

11. Write in figures the tens, beginning with ten.

12. Count *ten, twenty, thirty*, and so on to *ninety*.

13. Count *ninety, eighty, seventy*, and so on to *ten*.

14. Write the tens in figures, beginning with *ninety;* write them in a column.

25. Exercise:

1. Read, and tell how many tens there are in each:

20 80 30 70 50 90 60 40

2. Count by 10's to 50; from 50 to 90.

3. Count by 10's to 90; from 30 to 80.

4. Count by 10's from 50 to 0; from 90 to 50.

5. Count by 10's from 80 to 20; from 90 to 0.

6. What is another name for 20? 50? 30? 80? 60? 40? 70? 10? 90?

7. Give the name of 2 tens; 4 tens; 8 tens; 3 tens; 7 tens; 9 tens; 1 ten; 5 tens; 6 tens.

10 cents = 1 dime

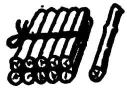
Read, supplying the missing numbers:

8. 2 dimes = — cents; 3 dimes = — cents.
9. 4 dimes = — cents; 9 dimes = — cents.
10. 7 dimes = — cents; 6 dimes = — cents.
11. 5 dimes = — cents; 8 dimes = — cents.
12. 20 cents = — dimes; 50 cents = — dimes.
13. 40 cents = — dimes; 30 cents = — dimes.
14. 80 cents = — dimes; 60 cents = — dimes.
15. 70 cents = — dimes; 90 cents = — dimes.

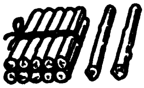
16. Write in figures: fifty; thirty; seventy; ten; eighty; forty; ninety; twenty; sixty.

X sometimes stands for ten.

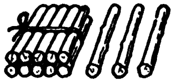
26. 1. Ten and one are **eleven**, written **11.**



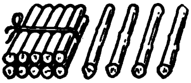
2. Ten and two are **twelve**, written **12.**



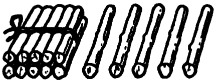
3. Ten and three are **thirteen**, written **13.**



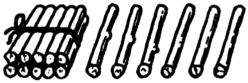
4. Ten and four are **fourteen**, written **14.**



5. Ten and five are **fifteen**, written **15.**



6. Ten and six are **sixteen**, written **16.**



To the Teacher. In teaching the numbers between ten and twenty use counters only until the process of forming the numbers between ten and twenty is understood.

7. Ten and seven make what number? ten and eight? ten and nine? ten and six? ten and four?

8. Write in figures the number made up of ten and seven; ten and eight; ten and nine; ten and five.

9. Read these numbers and tell for what each figure stands:

11 12 13 14 15 16 17 18 19

10. Read these numbers: 19, 15, 12, 14, 11, 17, 16.

11. 1 dime and five cents are how many cents?

27. Exercise:

1. Count from ten to twenty; from one to twenty.

2. Count from nine to one; from twenty to ten.

3. Count from twenty to one; from eighteen to eight.

4. Read these numbers: 17, 19, 12, 14, 11, 13, 16, 18, 15.

5. Write in figures: fourteen; ten; thirteen; eighteen; eleven; seventeen; fifteen; nineteen; twelve; sixteen.

6. Name the number made up of: ten and three; ten and one; ten and five; ten and two; ten and six; ten and four; ten and eight; ten and nine; ten and seven.

7. What number comes next after fourteen? next before fourteen? next after eighteen? next before eighteen? next before twelve? next after twelve?

8. Count by twos to ten; to twenty; from twelve to twenty; from one to nine; from nine to one.

9. Ten and how many make fourteen? sixteen? eleven? eighteen? twelve? nineteen? thirteen? fifteen? seventeen?

10. A dime and how many cents are worth 12 cents? 15 cents? 14 cents? 18 cents? 11 cents? 16 cents?

11. Read, saying the right number where the — is:

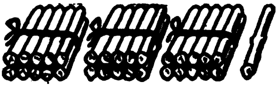
14 cents = 1 dime and — cents.
12 cents = 1 dime and — cents.
19 cents = 1 dime and — cents.
15 cents = 1 dime and — cents.

28. 1. Two tens and one make **twenty-one**, written **21**.

2. Two tens and two make **twenty-two**, written **22**.

3. Two tens and three make **twenty-three**, written **23**.

4. Three tens and one make **thirty-one**, written **31**.



29. Exercise:

Name and write in figures the number that is formed by:

1. two tens and four.
2. two tens and five.
3. two tens and six.
4. two tens and seven.
5. two tens and eight.
6. two tens and nine.

Name and write in figures the number that is formed by:

7. three tens and two.
8. three tens and three.
9. three tens and four.
10. three tens and five.
11. three tens and six.
12. three tens and seven.
13. three tens and eight.
14. three tens and nine.

Name the number that is formed by:

15. forty and one; forty and two; forty and three.
16. forty and four; forty and five; forty and six.
17. forty and seven; forty and eight; forty and nine.
18. fifty and six; fifty and one; fifty and three.
19. sixty and eight; seventy and two; eighty and five.
20. eighty and six; ninety and four; ninety and nine.

30. Exercise:

1. Read: 41 42 43 44 45 46 47 48 49

2. Name the numbers from:

fifty to sixty; sixty to seventy; seventy to eighty; eighty to ninety; ninety to ninety-nine.

3. Read across; read down; read up; then copy neatly, being sure to make no mistakes in copying:

51	52	53	54	55	56	57	58	59
61	62	63	64	65	66	67	68	69
71	72	73	74	75	76	77	78	79
81	82	83	84	85	86	87	88	89
91	92	93	94	95	96	97	98	99

TO THE TEACHER. In teaching the numbers between the tens from 20 to 99, use objects only until the plan of forming, naming, and writing the numbers between the tens is understood.

4. Read: 92 36 64 58 45 23 79
56 65 99 83 71 84 18 46 33

Count from:

5. 20 to 30; 30 to 20; 30 to 40; 40 to 30.

6. 40 to 60; 60 to 40; 60 to 99; 99 to 60.

In numbers of two figures the right-hand figure is called the *units'*, or *ones'*, figure, and the left-hand figure the *tens'* figure.

Write in figures and name the number made up of:

7. 3 tens and 2 ones; 4 tens and 5 ones.

8. 8 tens and 2 ones; 9 tens and 1 one.

31. Exercise :

1. Count by twos to twenty ; to forty.
2. Begin at one and count by twos to nine.
3. Count backwards by twos from ten.
4. What two numbers come between 13 and 16 ?
5. What three numbers come between 14 and 18 ?
6. State instantly the sum :

$6+2$	$2+5$	$5+3$	$3+3$	$4+4$
$4+5$	$2+4$	$7+2$	$3+2$	$4+3$
$3+5$	$2+7$	$3+4$	$5+4$	$6+3$

7. State instantly the difference :

$9-5$	$8-4$	$9-7$	$7-5$	$9-2$
$8-3$	$7-2$	$6-3$	$9-3$	$8-2$
$7-3$	$9-4$	$8-5$	$7-4$	$9-6$

8. Read, supplying the missing number at sight ; read from left to right ; read down the columns ; up the columns :

$?+3=7$	$5+?=7$	$8-?=5$	$?+5=8$
$9-?=6$	$4+?=7$	$?+6=9$	$9-?=4$
$?-5=4$	$3+?=8$	$7-?=3$	$?+4=9$
$?-5=3$	$5+?=9$	$7-?=5$	$?-2=5$
$?+4=8$	$9-?=5$	$?-7=2$	$?+2=9$
$9-3=?$	$?-4=5$	$?-3=6$	$?+3=8$

9. Write in a column all numbers of two figures which have 0 in the units' place ; which have 6 in the units' place ; 1 ; 5 ; 4 ; 9 ; 8 ; 3 ; 7 ; 2.

32. Exercise :

1. 2 cents and how many cents make a dime?

2. A nickel and 2 cents are worth how many cents?

3. Name two numbers that when added will make 9.

4. A farmer had 8 lambs and sold all of them but 2; how many did he sell?

5. 4 years ago Mary was 5 years old; how old is she now? How old were you 5 years ago?

6. Tell for what each figure stands in the following numbers:

25	72	46	54	58	15	61
32	94	77	45	35	29	83

Thus, in 72, the 7 stands for 7 tens, and the 2 for 2 units.

7. Write in figures and name the number made up of:

3 tens and 9 units; 7 tens and 2 units.
5 tens and 6 units; 2 tens and 2 units.

8. Count the stars in our flag. How many are there?

9. Look at the numbers in example 6 and tell which is the largest? the smallest?

10. How many of the numbers in example 6 are more than 58? How many are less than 46?

11. Rose and Alice have made 4 ham and 4 cheese sandwiches; how many of both kinds have they made?

12. Supply the missing numbers:

57 = 5 tens + — units; 68 = 6 tens + — units = 5 tens + — units.

Two Numbers of One Figure Each; Sum, 10 or More

33. Exercise:

Copy, supplying the missing numbers:

1.
9 + 1 =
1 + 9 =
8 + 2 =
2 + 8 =
7 + 3 =
3 + 7 =
6 + 4 =
4 + 6 =
5 + 5 =

2.
9 + 2 =
2 + 9 =
8 + 3 =
3 + 8 =
7 + 4 =
4 + 7 =
6 + 5 =
5 + 6 =
9 + 3 =

3.
3 + 9 =
8 + 4 =
4 + 8 =
7 + 5 =
5 + 7 =
6 + 6 =
9 + 4 =
4 + 9 =
8 + 5 =

4.
5 + 8 =
7 + 6 =
6 + 7 =
9 + 5 =
5 + 9 =
8 + 6 =
6 + 8 =
7 + 7 =
9 + 6 =

5.
6 + 9 =
8 + 7 =
7 + 8 =
8 + 8 =
9 + 7 =
7 + 9 =
9 + 8 =
8 + 9 =
9 + 9 =

To the Teacher. Both forms of such combinations as $\begin{smallmatrix}9\\ \underline{3}\end{smallmatrix}$ and $\begin{smallmatrix}3\\ \underline{9}\end{smallmatrix}$ in the above list of 45 should be taught. When duplicate forms are disregarded these 45 examples reduce to 25, as shown below. Use examples 1–8 for frequent sight drills. There are but 25 combinations of two numbers of one figure each in which the sum is 10 or more. These with the 20 examples at the foot of page 10 constitute the 45 elementary combinations in addition.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
6.	9	8	3	7	8	6	4	5	5
	$\underline{1}$	$\underline{3}$	$\underline{7}$	$\underline{4}$	$\underline{2}$	$\underline{4}$	$\underline{8}$	$\underline{6}$	$\underline{5}$
7.	9	5	9	6	9	5	9	6	
	$\underline{2}$	$\underline{7}$	$\underline{4}$	$\underline{6}$	$\underline{3}$	$\underline{8}$	$\underline{5}$	$\underline{8}$	
8.	7	6	7	7	8	9	8	9	
	$\underline{6}$	$\underline{9}$	$\underline{7}$	$\underline{9}$	$\underline{8}$	$\underline{8}$	$\underline{7}$	$\underline{9}$	

34. Exercise:

1. Our flag has 7 red stripes and 6 white ones; how many stripes has it in all?

12 is sometimes called a dozen

2. 6 eggs + how many eggs make a dozen?

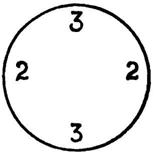
3. Frank was 9 years old 6 years ago; how old is he now? How old will he be in another year?

4. This morning James drove 8 cows to one field and 9 to another; how many did he drive to both?

5. A 5-cent bar of soap and an 8-cent can of corn cost how much?

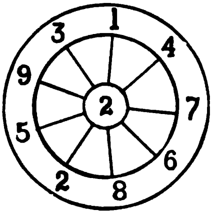
6. I earned 9 cents this morning selling papers and 5 cents running an errand; how much did I earn in all?

7. Start at 3 and add rapidly once around the ring; start at 2.



8. Samuel counted 9 blackbirds in one flock and 8 in another; how many did he count in both?

9. Point rapidly to each outer number, and as you do so add 2 to it. Change the inner number to 3 and add; to 4; to 5; to 6; to 7; to 8; to 9.



10. I cut 7 roses from my rosebush on Monday, 9 on Tuesday, and 8 on Wednesday; how many did I cut from it Monday and Tuesday? Monday and Wednesday?

Combinations of More than Two Numbers of One Figure Each

35. Exercise:

Add upward:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	1	2	3	2	4	5	5	8	3	6
	1	1	2	2	2	3	6	3	4	8
	1	1	1	2	1	1	3	2	4	1
2.	3	4	4	5	6	6	4	6	8	9
	3	3	4	3	2	1	7	6	1	5
	3	2	4	4	5	4	2	3	4	2
3.	3	4	7	6	8	9	5	9	9	9
	5	3	7	5	4	7	5	4	6	3
	4	5	2	3	4	2	3	5	1	6
4.	1	2	2	4	5	7	4	8	1	6
	1	2	3	4	4	4	6	3	9	7
	2	1	1	2	3	3	3	2	5	1
	1	2	2	3	2	2	1	4	2	1

5. Make a list of 8 other examples like those above and find the sums. The sums in each should be 18 or less.

6. Mary had 2 nickels; she then found one cent and her mother gave her 2 cents. How much money did she then have?

7. How many are 2 + 3 + 4 + 6? 4 + 4 + 1 + 7?

8. How many are 2 + 1 + 3 + 1 + 2 + 8?

A Number of One Figure from a Number of Two Figures

36. Exercise (Review Section 33):

1. Copy, supplying the missing numbers:

10 − 1 =
10 − 9 =
10 − 2 =
10 − 8 =
10 − 3 =
10 − 7 =
10 − 4 =
10 − 6 =
10 − 5 =
11 − 2 =
11 − 9 =
11 − 3 =
11 − 8 =
11 − 4 =
11 − 7 =
11 − 5 =
11 − 6 =
12 − 3 =
12 − 9 =
12 − 4 =
12 − 8 =
12 − 5 =
12 − 7 =
12 − 6 =
13 − 4 =
13 − 9 =
13 − 5 =
13 − 8 =
13 − 6 =
13 − 7 =
14 − 5 =
14 − 9 =
14 − 6 =
14 − 8 =
14 − 7 =
15 − 6 =
15 − 9 =
15 − 7 =
15 − 8 =
16 − 7 =
16 − 9 =
16 − 8 =
17 − 8 =
17 − 9 =
18 − 9 =

Here is another arrangement of the 45 examples above. Review them until you can give each difference at sight.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
2.	11 3	12 5	14 9	11 2	10 4	13 7	15 8	12 3	14 8
3.	10 6	11 4	13 5	14 7	10 1	10 7	12 6	14 5	17 8
4.	13 8	10 9	11 8	10 3	13 4	15 9	12 8	11 5	14 6
5.	10 2	11 7	13 9	12 7	16 8	10 5	12 9	11 6	16 9
6.	10 8	13 6	12 4	11 9	16 7	18 9	15 7	17 9	15 6

37. Exercise:

1. Caroline invited 13 girls to her birthday party; 5 of them did not come. How many came?

2. Frank had 15 picture post cards and mailed all of them but 6; how many did he mail?

3. I want to save 15 cents each week. I have saved 9 cents this week; how many more cents must I save?

4. Subtract at sight 1 from each number on the first line, 2 from each number on the second line, and so on.

10	3	5	8	1	7	6	2	4	9	1
8	5	2	10	9	6	3	11	7	4	2
12	9	6	4	11	8	5	3	10	7	3
6	12	4	10	8	11	9	7	5	13	4
14	5	12	10	8	13	6	11	9	7	5
13	15	7	11	9	14	12	6	10	8	6
16	8	14	10	15	13	7	12	11	9	7
16	17	8	15	10	14	12	9	13	11	8
18	16	10	12	14	15	17	9	13	11	9

TO THE TEACHER. Drill on the above table frequently, since on the pupil's mastery of it will depend, to a great extent, his progress and success in the subsequent work of subtraction. Example 4 asks for all the differences which are numbers of *one figure* resulting from subtracting from a number any number of *one figure*.

38. Exercise:

1. Count backwards by twos from 18; from 30 to 20.

2. Start at 19 and count backwards by twos to 1.

3. Write and read the two numbers that can be written with:

7 and 5   4 and 8   2 and 1   4 and 3   6 and 9

4. Write 9 other pairs of figures and the two numbers that can be written with each pair.

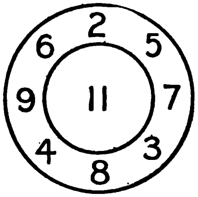
5. Supply at sight the missing numbers; have no two examples alike:

? + ? = 6   ? + ? = 7   ? + ? = 8   ? + ? = 9
? + ? = 6   ? + ? = 7   ? + ? = 8   ? + ? = 9
? + ? = 6   ? + ? = 7   ? + ? = 8   ? + ? = 9

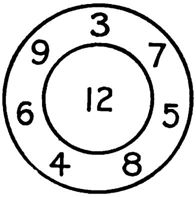
To the Teacher. Examples like 5 may serve for a "Guessing Game," the teacher saying, "I am thinking of two numbers whose sum is 6; guess what they are." The pupil should guess 5 and 1, 4 and 2, or 3 and 3. One of these groups is the one of which the teacher is thinking.

Subtract rapidly each outer number in each ring from the inner number, naming the results only:

6.



7.



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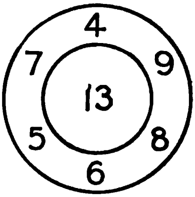
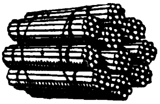


9. How many are 16 less 7? 16 less 9? 17 less 8? 16 less 8? 17 less 9? 14 less 5? 15 less 6? 14 less 7?

Numbers of Three Figures Each

39. Ten tens make **a hundred**, written **100**, which means **one** hundred, **no** tens, and **no** units.



40. Exercise:

Write in figures:

1. two hundred.
2. three hundred.
3. four hundred.
4. five hundred.
5. six hundred.
6. seven hundred.
7. eight hundred.
8. nine hundred.
9. one hundred.

41. One hundred and one make **one hundred one**, written **101**, which means **one** hundred, **no** tens, and **one** unit.

42. Exercise:

Name, and write in figures, the number made by uniting with one hundred:

1. two.
2. three.
3. four.
4. five.
5. six.
6. seven.
7. eight.
8. nine.

43. One hundred and ten make **one hundred ten**, written **110**, which means **one** hundred, **one** ten, and **no** units.

44. Exercise:

Name, and write in figures, the numbers made by uniting with one hundred:

1. twenty.
2. thirty.
3. forty.
4. fifty.
5. sixty.
6. seventy.
7. eighty.
8. ninety.

One hundred and eleven make **one hundred eleven**, written **111**.

45. Exercise:

Write in figures:

1. two hundred ten.
2. three hundred forty.
3. four hundred seventy.
4. five hundred eighty.
5. six hundred sixty.
6. seven hundred twenty.
7. eight hundred seventy.
8. nine hundred ten.

Write in figures the numbers between:

9. 110 and 120.
10. 150 and 160.
11. 190 and 200.
12. 200 and 210.
13. 280 and 290.
14. 350 and 360.
15. 420 and 430.
16. 560 and 570.
17. 630 and 640.
18. 760 and 770.
19. 820 and 830.
20. 980 and 990.

21. Read across; read down; read up:

101	212	900	516	159	202
112	300	901	642	222	301
307	426	910	257	906	311
219	510	777	600	819	401
248	763	999	801	810	191

22. Read the numbers in example 21 which are more than 800; more than 600; more than 500; less than 300.

23. Write the numbers in example 21 as your teacher reads them.

46. Exercise:

Count from:

1. 100 to 110. 2. 200 to 210. 3. 440 to 450.
4. 560 to 570. 5. 720 to 730. 6. 880 to 890.
7. 970 to 980. 8. 350 to 360. 9. 630 to 640.

Count backwards from:

10. 110 to 100. 11. 200 to 190. 12. 320 to 310.
13. 490 to 480. 14. 500 to 490. 15. 620 to 610.
16. 760 to 740. 17. 820 to 800. 18. 999 to 980.

In numbers of three figures the first, counting from the right, is called the **units'** figure, the second the **tens'** figure, and the third the **hundreds'** figure.

Name and write in figures the number made up of:

19. 7 hundreds. 20. 7 hundreds and 1 unit.
21. 3 hundreds, 2 tens, and 1 unit.
22. 3 hundreds. 23. 7 hundreds and 1 ten.
24. 9 hundreds, 1 ten, and 2 units.

25. Tell for what each figure stands in the following:

234 496 507 820 900
888 801 399 660 700

Write and read the six numbers that can be written with:

26. 7, 3, and 1. 27. 4, 8, and 2. 28. 5, 2, and 6.
29. 9, 7, and 6. 30. 4, 5, and 8. 31. 1, 2, and 8.

A Number of One Figure to a Number of Two Figures: Sum of the Units, Less than 10

47. Exercise:

1. Add at sight:

10	20	30	40	50	60	70	80	90
2	2	2	2	2	2	2	2	2

Instead of 2, add 3; 6; 4; 7; 9; 8; 5.

In examples 2–8 arrange the numbers to be added as they are arranged in example 1, and add at sight, naming results only:

2. Each of the numbers 2, 5, 3, 6, 4, 8, 7 to

11 21 31 41 51 61 71 81 91

3. Each of the numbers 2, 5, 3, 6, 4, 7 to

12 22 32 42 52 62 72 82 92

4. Each of the numbers 2, 5, 3, 6, 4 to

13 23 33 43 53 63 73 83 93

5. Each of the numbers 2, 5, 4, 3 to

14 24 34 44 54 64 74 84 94

6. Each of the numbers 2, 4, 3 to

15 25 35 45 55 65 75 85 95

7. Each of the numbers 3 and 2 to

16 26 36 46 56 66 76 86 96

8. 2 to

17 27 37 47 57 67 77 87 97

To the Teacher. Using the sums found in section 47, drill upon the corresponding differences. Thus, in example 1, subtract at sight 2 from each sum found by adding 2 to 10, 20, 30, etc.; name results only.

Numbers Involved: Less than 100; Sum of the Numbers in Each Column, Less than 10

48. Add 26 and 32.

26 2 units and 6 units are 8 units.
32 3 tens and 2 tens are 5 tens.
58 *In practice say:* 2 and 6 are 8; 3 and 2 are 5.

49. Exercise:

Copy and add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	20 30	40 50	20 60	50 40	30 50	50 20	40 30	30 60
2.	20 17	42 20	36 40	56 21	43 36	24 53	49 30	55 41
3.	56 32	52 35	18 81	32 55	17 72	65 34	83 12	76 22
4.	16 52 31	80 11 7	42 5 31	4 42 23	43 22 13	61 5 13	52 13 21	36 23 40
5.	33 10 35	42 15 31	32 6 21	20 32 17	41 14 33	73 11 13	24 41 32	60 27 12
6.	47 20 32	81 6 12	53 16 30	62 4 21	33 41 24	20 15 61	44 12 31	65 13 21

50. Exercise:

1.
42 cars
31 cars
cars

2.
27 bricks
52 bricks
bricks

3.
67 houses
32 houses
houses

4.
12 brooms
22 brooms
brooms

5.
20 lemons
52 lemons

6.
17 apples
51 apples

7.
32 plums
14 plums

8.
46 peaches
33 peaches

9.
9 trout
80 trout
10 trout

10.
13 frogs
65 frogs
11 frogs

11.
51 ducks
6 ducks
32 ducks

12.
24 rabbits
32 rabbits
3 rabbits

13. In a class there are 7 boys and 12 girls; how many children are there in the class?

14. Last week Frank earned 35 cents, and this week he has earned 42 cents; how much has he earned both weeks? Did he earn 8 dimes?

15. Henry spent 12 cents for marbles, 15 cents for a ball, and 10 cents for a top; how much did he spend for all? Did he spend more than 3 dimes and a nickel?

16. On our lawn there are 12 maple trees, 2 ash trees, and 4 willow trees; how many trees of the three kinds are there on our lawn? How many would there be if there were 5 willows?

17. In one day John sold 42 morning papers and 33 evening papers; how many papers did he sell that day?

51. Exercise:

1. How many persons are there seated at three tables, if there are 12 persons at one of them, 10 at another, and 6 at another?

2. Mrs. Brown used 14 eggs on Monday, 11 on Tuesday, and a dozen on Wednesday; how many did she use during the three days? Did she use more than 3 dozen?

3. Find the cost of a 15-cent knife, a 20-cent story book, and a 12-cent fishing line.

4. Frank has 12 pigeons, George has 32, and William has 15; how many have they together?

5. Find how much Margaret should pay if she made these purchases:

1 piece of tape, 12 cents.
1 spool of thread, 6 cents.
1 hat pin, 10 cents.
1 card of hooks and eyes, 10 cents.

Should Margaret pay more or less than 4 dimes?

6. If there are 12 chairs at each side of a table and a chair at each end, how many are there in all?

7. Gladys bought a set of doll's dishes for 12 cents, a doll's table for 25 cents, and a doll's chair for 20 cents. How much did she pay for all? Did she pay more or less than 6 dimes?

8. Name the sum of 10, 10, and 20. Of 30 and 20.

9. How many are $2+2+1+2+2+7$?

A Number of One Figure to a Number of Two Figures; Sum of the Units, 10 or More

52. Exercise:

1. Add at sight:

19	29	39	49	59	69	79	89
2	2	2	2	2	2	2	2

Instead of 2, add 1; 3; 5; 6; 4; 8; 7; 9.

In examples 2–9 arrange the numbers to be added as they are arranged in example 1, and add at sight, naming results only.

2. Each of the numbers 2, 5, 3, 6, 4, 8, 7, 9 to

18 38 58 28 48 68 88 78

3. Each of the numbers 5, 3, 6, 4, 8, 7, 9 to

17 37 57 27 47 67 87 77

4. Each of the numbers 5, 8, 6, 9, 7, 4 to

16 36 56 26 46 66 86 76

5. Each of the numbers 5, 8, 6, 7, 9 to each number of two figures ending in 5.

6. Each of the numbers 6, 8, 7, 9 to each number of two figures ending in 4.

7. Each of the numbers 8, 7, 9 to each number of two figures ending in 3.

8. Each of the numbers 8 and 9 to each number of two figures ending in 2.

9. 9 to each number of two figures ending in 1.

To the Teacher. Using the sums found in section 52, drill upon the corresponding differences. See "To the Teacher," page 34.

Numbers Involved, Less than 100; Sum of the Units, 10 or More

53. Add 58 and 34.

$$\begin{array}{r}58\\ \underline{34}\\ 92\end{array}$$

4 units and 8 units are 12 units, or 1 ten and 2 units.
Write 2 in units' place and add 1 to the tens.
1 ten, 3 tens, and 5 tens are 9 tens.
Write 9 in tens' place. The sum is 92.
In practice say: 4 and 8 are 12; 1, 3, and 5 are 9.

54. Exercise:

Copy and add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	24 28	32 18	16 25	41 49	55 38	35 47	29 62	53 27
2.	46 47	52 29	63 18	78 19	37 47	19 67	25 58	37 48
3.	56 28	19 51	26 64	53 29	28 68	18 46	73 17	64 18
4.	16 32 14	28 41 23	56 13 22	38 40 19	14 7 46	26 42 17	15 29 46	19 44 23
5.	48 7 9	25 9 19	58 19 20	8 44 9	31 17 9	58 31 7	14 39 26	72 18 6
6.	42 19 31	67 18 9	36 17 46	57 8 26	17 45 28	29 31 16	13 47 34	49 23 15

55. Exercise:

1.
46 shrubs
19 shrubs
shrubs

2.
38 pinks
45 pinks
pinks

3
24 daisies
67 daisies
daisies

4.
36 trees
54 trees
trees

5.
19 rugs
39 rugs
7 rugs

6.
46 lamps
8 lamps
9 lamps

7.
21 chairs
15 chairs
28 chairs

8.
14 tables
17 tables
64 tables

9. Last month I attended school 18 days and this month 19 days; how many days did I attend in both months?

10. A gardener planted 24 rows of cabbages and 18 rows of celery; how many rows of both did he plant?

11. A conductor collected 46 fares on one trip and 45 on another; how many did he collect on both trips?

12. Last week William earned 25 cents running errands, and this week 48 cents; how much did he earn both weeks? Did he earn 7 dimes and a nickel?

13. Father hauled to the barn 34 loads of hay from one field and 37 from another; how many did he haul from both fields?

14. John had 48 pigeons and bought 24 more; how many had he then?

15. 46 boys and 48 girls in the first grade are how many children in that grade?

Numbers Involved, Less than 100; the Lower Number in Each Column Less than the Upper

56. Subtract 25 from 68.

Minuend	68
Subtrahend	25
Difference	43

Write 25 under 68, placing the ones of both numbers in the same column. Begin at the ones' column.

Think:	$8 - 5 = 3$.	Write **3**	or *think:*	$5 + 3 = 8$.	Write **3**
	$6 - 2 = 4$.	Write **4**		$2 + 4 = 6$.	Write **4**

The difference is 43. *Check:* $25 + 43 = 68$.

To the Teacher. Some teachers prefer the method of directly subtracting in finding the difference of two numbers, while others prefer the addition, or so-called Austrian method. In written subtraction, *one method only* should be followed.

57. Exercise:

Copy, subtract, and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	57	61	39	88	67	35	46	99	58	29
	35	20	24	63	15	21	13	76	26	13
2.	62	99	74	87	59	63	47	39	77	96
	30	25	42	55	45	21	30	28	25	44
3.	88	87	99	87	89	45	39	75	48	67
	56	52	18	30	17	23	17	53	26	43
4.	92	56	43	55	88	95	83	69	36	68
	40	14	32	20	52	60	51	47	25	37
5.	46	84	69	96	79	67	53	87	47	59
	33	52	35	55	67	34	21	63	25	36

58. Exercise:

In examples 1–4, subtract and check:

1.	2.	3.	4.
56 buds	47 leaves	68 roses	58 violets
32 buds	13 leaves	43 roses	24 violets
buds	leaves	roses	violets

5. Eleanor wishes to save 25 cents; if she has already saved 14 cents, how much more must she save?

6. A man bought 48 shad; how many had he left after he had sold 26 of them?

7. A farmer took to market 75 boxes of berries; if he sold all but 12 boxes, how many boxes did he sell?

8. My vacation lasts 84 days; if 52 of them have passed, how many remain?

9. Ten of a farmer's 24 cows are in a stable, and the others in the field; how many are in the field?

10. In a school of 48 children, 22 of them are boys; how many are girls?

11. I had 78 cents and spent 25 cents for a kite; how much had I left?

12. If you buy a 12-cent tablet, how much change should you get from 25 cents?

13. If you have 29 cents and buy a thrift stamp for 25 cents, how much will you have left?

14. On what page is this example? Turn back 20 pages and tell the number of that page.

Numbers Involved, Less than 100; the Lower Number in Units' Column Greater than the Upper

59. Subtract 27 from 83. In practice write only this:

83 = 7 tens + 13 units
27 = 2 tens + 7 units
Difference = 5 tens + 6 units = 56

83
27
56

Check:
27
56
83

Think: 13 − 7 = 6. Write **6**
7 − 2 = 5. Write **5**

or *think:* 7 + 6 = 13. Write **6**
2 + 5 = 7. Write **5**

To the Teacher. Of the methods of written subtraction set forth on this page teach the one by which you believe you secure the best results.

60. Exercise:

Copy, subtract, and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	32	41	56	82	45	47	63	34	51	42
	17	25	38	18	29	38	49	18	39	26
2.	42	74	62	27	43	57	31	65	87	76
	29	36	19	18	19	28	15	56	69	48
3.	77	93	50	70	32	43	54	62	78	83
	58	84	41	36	27	25	36	45	19	67
4.	81	60	35	48	77	52	65	91	57	68
	29	18	27	39	29	34	39	72	29	49

Remark. There are two other common methods in written subtraction, illustrated by the following:

83
27
56

Since 7 is more than 3, think 7 + ? = 13? 7 + **6** = 13. Write **6**.

Since the sum is 13, there is 1 to carry. 1 + 2 + **5** = 8. Write **5**.

The difference is 56.

83
27
56

Add 10 to the 3 of the minuend, and subtract 7 from 13. Add 1 ten to the 2 tens of the subtrahend and subtract 3 from 8.

The difference is 56.

61. Exercise:

1.	2.	3.	4.
60 posts	52 boards	61 rails	80 logs
37 posts	28 boards	27 rails	51 logs

5. Frank has 26 tin soldiers and George has 17; how many more has Frank than George?

6. A boy is 17 years old and his father is 41 years old; how much older is the father than the boy?

7. Grace wrote 31 words. She erased 12 of them; how many were left?

8. A boy that weighs 68 pounds must gain how many pounds to weigh 85 pounds?

9. On one shelf there are 51 books and on another 29; how many more are there on the one than on the other?

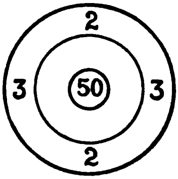
10. My album holds 50 pictures; if I have 18 pictures in it, how many are needed to fill it?

11. Sherman has saved 42 cents; how much more must he save to buy a toy airship that costs 80 cents?

12. Julia has saved 28 cents; how much more must she save to buy a bungalow doll house that costs 47 cents?

13. My sister is reading a book of 96 pages; she has read 58 pages of it. How many has she yet to read?

14. Subtract rapidly from 50 the numbers around the ring one after another, thus: 50, 48, 45, 43, 40, etc., to 0.

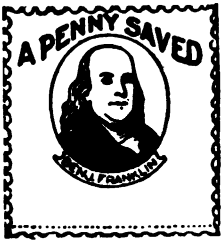


62. Exercise: Can you read this letter from Uncle Sam?

DEAR CHILDREN:

This is a picture of the penny receipts your teacher will stamp in the twenty-four *blank* spaces of your **Penny School Savings Book**. When you give your teacher the 25th penny she will initial this picture and exchange the book for a **Thrift Stamp**.

Yours for thrift,
UNCLE SAM.



1. If you save a penny a day each school day of a week, how many pennies do you save in the five days?

2. Name some things which boys can do to earn money; some things which girls can do; some things which you do.

3. How much money did you earn last week? How much have you saved? What do you do with your savings?

4. Samuel saved old newspapers last month and sold them to a dealer for 28 cents. He spent 12 cents of this money and saved the remainder; how much did he save?

5. Mildred and her three sisters are saving to buy thrift stamps. Last week Mildred saved 9 cents, two of her sisters saved 10 cents each, and her other sister saved 11 cents; how much did they all save?

TO THE TEACHER. Government officials are urging teachers to assist in making permanent among our people habits of thrift begun during the war. The Penny School Savings Book has been provided to encourage school children to save small amounts toward the purchase of United States thrift stamps and war savings stamps. The Government Loan Organization War Savings Committee of your Federal Reserve District will furnish you these books. Even if these Penny School Savings Books are not available, the teacher should encourage pupils to save their pennies and buy thrift stamps.

63. Exercise:

The number 756 is here written in two ways:

756 = 7 hundreds + 5 tens + 6 units.

1. Write 842 in two ways; 592; 378; 986.

2. Add rapidly:

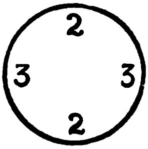
20	40	20	30	40	40	50
30	50	70	30	40	30	20

3. Start at 1 and count by twos to 35; to 65.

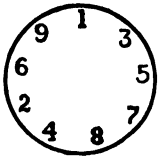
4. Count by 5's to 50; count by 5's from 50 to 0.

5. Write all the numbers of two figures that end in 4; add rapidly 9 to each.

6. Add around the ring until the sum is 50.



7. Start at each number and add twice around the ring.

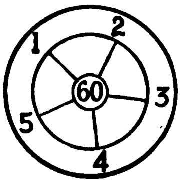


8. Find the sum of all numbers less than 10.

9. Write all the numbers of two figures each that end in 1; subtract at sight 9 from each of them.

10. Start at 37 and count backwards by 2's to 1. Start at 2 and count by 3's to 32; then count backwards by 3's from 32 to 2.

11. Start at 60 and subtract rapidly the numbers around the ring one after another; continue until the result is 0.



12. Count by tens to 100; then count backwards to 0.

64. Exercise:

1. Name the answers as soon as the teacher has read:

5 + 4 - 3 + 2 + 5; 7 + 6 - 5 - 2 + 3; 7 + 8 - 6 + 5 - 9.

TO THE TEACHER. Example 1 is merely suggestive; ask for the answers to many like it.

2. 2 dimes, a nickel, and a cent are worth how many cents? 2 dimes and 2 nickels are worth how many cents?

3. I have 3 pieces of money in my pocket that are together worth 16 cents; what are they?

4. How much change should George have after he has paid for a 5-cent ball, a 3-cent top, and a 4-cent toy rabbit, if he gave in payment a dime and a nickel?

5. Start at 5 and count by 10's to 95; then count back by tens from 95 to 5.

6. The sum of 32 and 48 is how much less than 100?

Add upward; add across:

7. 1 + 2 + 3 = ?
5 + 2 + 4 = ?
3 + 3 + 1 = ?
? + ? + ? = ?

8. 7 + 6 + 8 + 9 = ?
3 + 4 + 7 + 8 = ?
5 + 9 + 6 + 7 = ?
? + ? + ? + ? = ?

Add:

9. 7
2
4
5
1
3
5
2
1

Add upwards; subtract across:

10. 17 - 9 = ?
18 - 9 = ?
12 - 8 = ?

11. 25 - 12 = ?
36 - 14 = ?
31 - 17 = ?

12. How much change should a boy receive from a 50-cent piece that he gives in payment for a 25-cent knife, a 10-cent ball, and a 5-cent pencil?

65. Exercise:

1. In the figure to the right add the numbers in each row; in each column; from *A* to *C*; from *B* to *D*. What is each sum?

D C

6	1	8
7	5	3
2	9	4

A B

Here are all the combinations of two numbers of one figure each; there are *forty-five* of them. Your teacher will time you to find out how long it takes you to name, at sight, the *right sums*; then how long it takes you to name, at sight, the *right differences*. Try again to better your record.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
2.	4 2	1 1	7 4	8 1	3 2	9 1	5 5	9 7	5 4
3.	8 6	6 3	7 1	8 7	6 6	9 4	5 1	7 3	5 2
4.	7 7	2 1	5 3	8 5	8 2	3 3	6 5	7 6	7 5
5.	4 1	9 6	8 4	2 2	6 1	9 8	8 8	7 2	4 4
6.	6 4	6 2	9 3	4 3	8 3	9 2	9 9	3 1	9 5

To the Teacher. Review these 45 combinations in addition frequently and until the pupil can name any one of the sums at sight. He should make a list of the combinations which are the most difficult for him and master this list as quickly as possible.

Multiplying by 2

66. 3 plums + 3 plums are 2 **times** 3 plums.
2 times 3 plums may be written *2 × 3 plums.*
The sign × stands for **times**.

67. Exercise :

1. Copy and add :

1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10

2. How many are 1 + 1 ? How many are 2 × 1 ?

3. How many are 2 + 2 ? How many are 2 × 2 ?

4. How many are 3 + 3 ? 2 × 3 ? 4 + 4 ? 2 × 4 ?

5. How many are :

5 + 5 ? 2 × 5 ? 6 + 6 ? 2 × 6 ? 7 + 7 ? 2 × 7 ?
8 + 8 ? 2 × 8 ? 9 + 9 ? 2 × 9 ? 10 + 10 ? 2 × 10 ?

6. How many are 2 × 1? 2 × 2 ? 2 × 3 ? 2 × 4 ? 2 × 5 ? 2 × 6 ? 2 × 7 ? 2 × 8 ? 2 × 9 ? 2 × 10 ?

68. **Table**

2 × 1 = 2
2 × 2 = 4
2 × 3 = 6
2 × 4 = 8
2 × 5 = 10
2 × 6 = 12
2 × 7 = 14
2 × 8 = 16
2 × 9 = 18
2 × 10 = 20

To the Teacher. Have pupils build up this table from example 1 of exercise 67 ; then drill them upon it daily until they remember it.

69. Exercise:

1. How many are:

two 3's?	two 5's?	two 4's?	two 2's?	two 6's?
two 1's?	two 7's?	two 9's?	two 8's?	two 10's?

2. What do 2 one-cent stamps cost?

3. What do 2 two-cent stamps cost?

4. Find the cost of:

2 tablets at 6 cents each;
2 lemons at 3 cents each;
2 pencils at 5 cents each.

5. Two dimes are worth how many cents?

6. How many shoes make a pair?

7. How many pigeons are there in two pairs of pigeons?

8. How many horses will make 2 six-horse teams?

9. How many days are there in 2 weeks?

10. How many wheels have two wagons?

11. What piece of money will pay for 2 five-cent car fares?

12. How many trees are there in two rows, 8 in each row? in 2 rows, 10 in each row?

13. I have a nickel and 4 cents in each hand; how much money have I in both?

14. How much must you pay for 2 ten-cent picture books?

15. Write the table of 2's.

Dividing by 2

70. 1. How many strokes are there on this line? ||| |||

2. Into how many parts are these strokes divided?

3. See that the parts are alike by counting the strokes in each part.

71. Parts that are alike are said to be equal.

1. Show by strokes the two equal parts of 10; 12; 14.

2. Name one of the two equal parts of 2; 4; 6; 8; 10.

72. Each of the two equal parts of 6 is called one half of 6.

Point to one half of 6 strokes. ||| |||

One half is written $\frac{1}{2}$.

73. Exercise:

1. What is $\frac{1}{2}$ of 2? $\frac{1}{2}$ of 4? $\frac{1}{2}$ of 6? $\frac{1}{2}$ of 8? $\frac{1}{2}$ of 10?

2. Count halfway to 10; halfway to 16.

3. $\frac{1}{2}$ of ten cents is worth what piece of money?

4. I have 20 one-cent pieces; what piece of money could I get for half of them? what two pieces?

5. Count the strokes on this line. || || ||

6. How many strokes are there in each group? How many groups are there? How many 2's are there in 6?

7. How many 2-cent stamps can be bought for 8 cents? 10 cents? 16 cents? 20 cents? 14 cents? 18 cents?

Multiplying by 3

74. Exercise:

1. Copy and add:

1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10

2. From the sums in example 1, tell how many are: three 1's; three 2's; three 3's; three 4's; three 5's; three 6's; three 7's; three 8's; three 9's; three 10's.

75. **Table**

3 × 1 = 3
3 × 2 = 6
3 × 3 = 9
3 × 4 = 12
3 × 5 = 15
3 × 6 = 18
3 × 7 = 21
3 × 8 = 24
3 × 9 = 27
3 × 10 = 30

76. Exercise:

1. Copy, writing the right number after = :

3 × 2 = 3 × 4 = 3 × 1 = 3 × 5 = 3 × 3 =
3 × 6 = 3 × 9 = 3 × 8 = 3 × 7 = 3 × 10 =

2. How many are:

three 2's? three 1's? three 4's? three 3's? three 10's?
three 6's? three 5's? three 7's? three 9's? three 8's?

3. Repeat the table of 2's; the table of 3's.

4. Write the table of 2's; the table of 3's.

77. Exercise:

1. What do 3 postal cards cost?

2. How much must May pay for 3 two-cent paper dolls?

3. What do 3 two-cent stamps cost?

4. How many wheels have 3 automobiles?

5. How many pencils in 3 boxes, 6 pencils in a box?

6. 3 dimes are worth how many cents?

7. 3 nickels are worth how many cents?

8. How many days are there in 3 weeks?

9. 3 hens with 10 chicks each have how many chicks?

10. 3 rows of fruit jars, 9 in a row, are how many fruit jars? 3 rows, 10 in a row?

11. In 3 four-horse teams there are how many horses?

12. How many pigeons are needed to make 3 pairs of pigeons?

13. A passenger car has 8 wheels; three passenger cars have how many wheels?

14. Mary wrote this little note to Jane: *Come home soon.* How many letters are there in the note?

15. Count by 4's to 12; by 5's to 15.

16. Count by 6's to 18; by 10's to 30.

17. Count by 7's to 21; by 8's to 24.

18. A dozen eggs are 3 times how many eggs?

19. $6+6+6=?$ $3 \times 6=?$ $7+7+7=?$ $3 \times 7=?$

20. $8+8+8=?$ $3 \times 8=?$ $9+9+9=?$ $3 \times 9=?$

Dividing by 3

78. Here are 12 dots in 3 *equal* groups:

●●●● ●●●● ●●●●

79. Each of the three equal parts of 12 is called one third of 12.

One third is written $\frac{1}{3}$.

80. Exercise:

1. Find by using drawings or objects:

$\frac{1}{3}$ of 3 $\frac{1}{3}$ of 6 $\frac{1}{3}$ of 9 $\frac{1}{3}$ of 12 $\frac{1}{3}$ of 15

2. Score 15 thus: 𝍸 𝍸 𝍸 . Rub out $\frac{1}{3}$ of 15 strokes.

3. A teacher has 18 children in 3 classes, in each class the same number; how many has she in each class?

4. If a dozen cans are placed in 3 rows, the same number in each row, how many are there in each row?

5. I planted 24 tomato plants in 3 rows, the same number in each; how many did I plant in each row?

6. I had 30 pennies and exchanged $\frac{1}{3}$ of them for a piece of money; what piece?

7. Count the strokes on this line. ||| |||

How many strokes are there in each group? How many groups are there? How many 3's are there in 6?

8. Find out how many 3's there are in 9; in 12; in 15; in 18; in 21; in 24; in 27; in 30.

9. A dozen buttons are sewed on a card in rows, 3 buttons in each row; how many rows are there?

Multiplying by 4

81. Exercise:

1. Copy and add:

1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10

2. From the sums in example 1, tell how many are:
four 1's; four 2's; four 3's; four 4's; four 5's;
four 6's; four 7's; four 8's; four 9's; four 10's.

82. **Table**

4 × 1 = 4	4 × 6 = 24
4 × 2 = 8	4 × 7 = 28
4 × 3 = 12	4 × 8 = 32
4 × 4 = 16	4 × 9 = 36
4 × 5 = 20	4 × 10 = 40

83. Exercise:

1. Read, naming at sight the right number after = :
4 × 2 = 4 × 5 = 4 × 1 = 4 × 3 = 4 × 6 =
4 × 4 = 4 × 7 = 4 × 8 = 4 × 10 = 4 × 9 =

2. How many are:
four 2's? four 9's? four 6's? four 1's? four 5's?
four 8's? four 10's? four 4's? four 7's? four 3's?

3. 5 + 5 + 5 + 5 = ? four 5's = ? 10 + 10 + 10 + 10 = ?
four 10's = ? 6 + 6 + 6 + 6 = ? four 6's = ?

4. Write the table of 3's. 5. Write the table of 4's.

84. Exercise:

1. Say the right number where each question mark is:

$4 \times ? = 12$ $4 \times ? = 20$ $4 \times ? = 24$ $4 \times ? = 16$
$4 \times ? = 28$ $4 \times ? = 36$ $4 \times ? = 32$ $4 \times ? = 40$

2. 4 three-cent rulers cost how many cents?

3. In 4 weeks there are how many days?

4. Find the cost of 4 five-cent tablets.

5. How many buttons are on a card of 4 rows of buttons, 3 buttons to a row? 6 buttons to a row?

6. Find how much must be paid for all:

4 one-cent postal cards;
4 five-cent postage stamps;
4 two-cent postage stamps.

7. Find the cost of all:

4 two-cent papers;
4 four-cent spools of thread;
4 five-cent bars of soap;
4 eight-cent coat hooks.

8. The children at Sara's May party marched in couples; there were 4 couples. How many children were there at her party?

9. 4 dimes are worth 25 cents, a dime, and what other piece of money?

10. Raymond paid 6 cents car fare for himself and each of his three school friends; how much change did he receive from 25 cents?

11. 4 dimes are worth how many nickels? 4 dimes are worth how many cents?

Dividing by 4

85. How many strokes are here? || || || || How many equal groups? How many strokes are there in each group?

86. Each of the four equal parts of 8 is called one fourth of 8.

One fourth is written $\frac{1}{4}$.

87. Exercise:

1. Find by using drawings or objects (if necessary):

$\frac{1}{4}$ of 20 $\frac{1}{4}$ of 12 $\frac{1}{4}$ of 16 $\frac{1}{4}$ of 24
$\frac{1}{4}$ of 40 $\frac{1}{4}$ of 28 $\frac{1}{4}$ of 32 $\frac{1}{4}$ of 36

2. Score 20 thus:

Rub out $\frac{1}{4}$ of 20 strokes.

3. 8 cents will pay for how many 4-cent apples?

4. If 24 pencils are divided into 4 equal bunches, how many pencils are there in each bunch?

5. Count the rings shown here. How many are there in one group? How many groups are there? How many 4's are there in 12?

○○○○
○○○○
○○○○

6. Find out how many 4's there are in 8; in 16; in 20; in 40; in 24; in 32; in 36.

7. 20 cents will buy how many tops at 4 cents each?

8. At 4 cents each, how many packages of needles can be bought for 20 cents? for 24 cents? for 36 cents?

9. A woman spent 40 cents for 4 handkerchiefs; she paid the same price for each. How much did she pay for each? How much did she pay for 3 handkerchiefs?

Multiplying by 5

88. Find as in example 1, section 81, how many are:

five 1's five 2's five 3's five 4's five 5's
five 6's five 7's five 8's five 9's five 10's

89. **Table**

$5 \times 1 = 5$
$5 \times 2 = 10$
$5 \times 3 = 15$
$5 \times 4 = 20$
$5 \times 5 = 25$
$5 \times 6 = 30$
$5 \times 7 = 35$
$5 \times 8 = 40$
$5 \times 9 = 45$
$5 \times 10 = 50$

90. Exercise:

1. How many are:

five 3's? five 4's? five 2's? five 6's? five 9's?
five 5's? five 8's? five 1's? five 7's? five 10's?

2. How many horses are needed for 5 four-horse teams?

3. 5 packages of pencils, 6 pencils to the package, are how many pencils?

4. 5 dimes are worth how many cents? how many nickels?

5. 5 nickels are worth how many one-cent pieces?

Find the cost of:

6. 5 pairs of shoe laces at 10 cents a pair.

7. 5 pounds of rice at 8 cents a pound.

8. Repeat and write the table of 3's; of 4's; of 5's.

Dividing by 5

91. 1. How many dots are here? how many groups of dots?

● ● ●   ● ● ●   ● ● ●   ● ● ●   ● ● ●

2. Count the number of dots in each group to see that the groups are equal.

92. Each of the five equal parts of 15 is called one fifth of 15.

One fifth is written $\frac{1}{5}$.

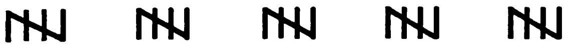
93. Exercise:

1. Find by using drawings or objects (if necessary)

$\frac{1}{5}$ of 10 $\frac{1}{5}$ of 20 $\frac{1}{5}$ of 30 $\frac{1}{5}$ of 40

$\frac{1}{5}$ of 50 $\frac{1}{5}$ of 25 $\frac{1}{5}$ of 35 $\frac{1}{5}$ of 45

2. Score 25 thus:



Rub out $\frac{1}{5}$ of 25 strokes.

3. $\frac{1}{5}$ of 10 cents equals how many cents?

4. 5 boys shared 30 firecrackers equally; how many did each receive?

5. Look at example 2 and count by 5's to 25.

6. Show how many 5's there are in 15.

7. 30 cents will pay the fares on a trolley car for how many persons, if the fare for each person is 5 cents?

8. 25 one-cent pieces are worth how many nickels?

9. If 30 stalks of celery are put up in 5 equal bunches, how many stalks are there in 1 bunch?

94. Such liquids as milk, oil, and vinegar are sold by these measures:

1 pint

1 quart

1 gallon

95. Learn by measuring that:

2 pints (pt.) = 1 quart (qt.)
4 quarts = 1 gallon (gal.)

96. Exercise:

1. Repeat the table of liquid measure.

2. Say the right number after = :

1 qt. = — pt.
2 gal. = — qt.
4 qt. = — pt.
8 qt. = — gal.
16 qt. = — gal
20 qt. = — gal.

1 gal. = — qt.
3 gal. = — qt.
5 qt. = — pt.
12 qt. = — gal.
10 pt. = — qt.
1 gal. = — pt.

2 qt. = — pt.
5 gal. = — qt.
4 pt. = — qt.
8 pt. = — qt.
40 qt. = — gal.
2 gal. = — pt.

3. Find out what a quart of milk costs; a quart of sirup; a quart of vinegar.

4. At the prices you named, what will 2 qt. of milk cost? a pint of sirup? a gallon of vinegar?

97. Exercise:

1. How many pints are there in a quart? How many quarts are there in a gallon?

2. Find the cost of 2 qt. milk at 14 cents a quart (add).

3. Find the cost of 4 qt. vinegar at 10 cents a quart.

4. Find the cost of all:

1 pt. cream, 25 cents;
1 qt. milk, 14 cents;
1 qt. vinegar, 15 cents.

5. A quart of cream will fill how many pint bottles?

6. A gallon of milk will fill how many quart bottles?

7. A quart and a pint of cream will fill how many pint bottles?

Fill in the missing numbers:

8. 2 qt. + 3 qt. = — qt.; 5 pt. + 2 pt. = — pt.
9. 4 gal. + 2 gal. = — gal.; 2 × 3 gal. = — gal.
10. 8 gal. − 2 gal. = — gal.; $\frac{1}{2}$ of 8 qt. = — qt.
11. 2 qt. + 3 qt. + 3 qt. = — qt., or — gal.
12. 5 qt. + 3 qt. = — qt., or — gal.
13. 2 pt. + 4 pt. = — pt., or — qt.

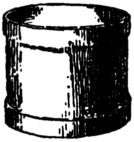
14. Frances bought a quart of milk for 14 cents and a pint of vinegar for 8 cents; how much more than 2 dimes did they both cost?

15. A 10-quart bucket will hold — gal. and — qt. over.

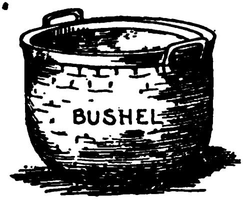
16. Have you ever bought a quart or a pint of anything? If you have, how much did you pay for it?

1 pint

1 quart



1 peck



1 bushel

98. Learn by measuring that:

2 pints (pt.) = 1 quart (qt.)
8 quarts = 1 peck (pk.)
4 pecks = 1 bushel (bu.)

To the Teacher. When possible, have pupils see liquid measures and dry measures put to practical use.

99. Exercise:

1. Name three things that are sold by the bushel; three things that are sold by the peck; three things that are sold by the quart; and three things that are sold by the pint. Tell, if you can, the prices at which the articles you name are sold.

2. Repeat the table of dry measure.

3. Say the right number after = :

1 qt. = — pt.
2 qt. = — pt.
5 qt. = — pt.
4 pt. = — qt.
6 pt. = — qt.

1 pk. = — qt.
3 pk. = — qt.
4 pk. = — qt.
16 qt. = — pk.
24 qt. = — pk.

1 bu. = — pk.
2 bu. = — pk.
5 bu. = — pk.
8 pk. = — bu.
16 pk. = — bu.

100. Exercise:

1. Find the cost of all:

1 pt. lima beans, 15 cents;
1 qt. blackberries, 15 cents;
1 qt. plums, 20 cents.

Read, supplying the missing numbers:

2. 2 quarts of berries will fill — pint boxes.
3. 2 pk. = — qt.; 4 qt. = — pt.; 3 bu. = — pk.
4. 8 qt. = — pk.; 12 pk. = — bu.; 10 pt. = — qt.
5. 5 qt. of lima beans will fill how many pint boxes?
6. A 2-bushel box will hold how many pecks of apples? A 4-bushel box will hold how many pecks?
7. A 3-bushel bag will hold how many pecks of grass seed? A 5-bushel box will hold how many pecks?

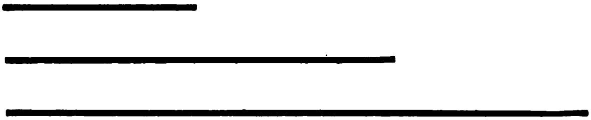
Copy and fill in the missing numbers:

8. 10 pk. + 6 pk. = — pk. = — bu.
9. 5 qt. + 3 qt. = — qt., or — pk.
10. 4 pk. + 3 pk. + 1 pk. = — pk., or — bu.
11. 8 pk. − 2 pk. = — pk.; 10 bu. − 4 bu. = — bu.
12. Don grew 4 quarts of strawberries in his home garden; how many pint boxes would they fill?
13. What does a peck of potatoes cost where you live?

101. Exercise:

1. This line is 1 inch long.

2. Look at the next three lines. How long do you think the first line is? the second? the third?

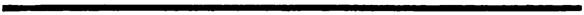


3. Which is the shortest? the longest?

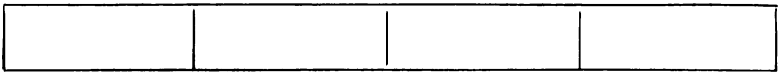
4. How many are longer than the first? How many are shorter than the third? Which one is longer than the first and shorter than the third?

5. Draw a line shorter than the first; longer than the third; longer than the second but shorter than the third.

6. With a ruler marked off in inches measure this line:



7. How many inches long is this ruler?



8. Make a ruler 6 inches long out of cardboard and mark it off in inches.

9. Draw a line 2 inches long; 3 inches; 6 inches.

102. Exercise:

1. Draw on a blackboard a line 12 inches long.

12 inches (in.) = 1 foot (ft.)

2. Make a ruler 1 foot long and mark it off in inches.

3. Draw on the blackboard a line a foot long.

4. Draw a long line on the blackboard and mark off on it 1 foot; 2 feet; 3 feet.

5. Measure a yardstick with a foot ruler.

3 feet (ft.) = 1 yard (yd.)

6. How many feet are there in 2 yards? in 3 yards?

7. 3 in. + 6 in. are how many inches? 4 in. + 8 in.?

8. 9 in. + 3 in. = — in., or — ft.

9. 12 in. + 12 in. = — in.; 2 ft. = — in.

10. Make a list of 5 articles that we buy by the yard.

11. Sara bought a yard of ribbon for 8 cents and a yard of lace for 10 cents. How much did they cost?

12. Helen bought a yard of ribbon for 12 cents and a yard of muslin for 25 cents. How much did they cost?

13. What 3 pieces of money will pay for a yard of ribbon at 9 cents and a yard of tape at 7 cents?

14. Anna bought a yard of gingham for 20 cents, a yard of ribbon for 12 cents, and a yard of lace for 15 cents. She gave in payment 5 dimes. How much change should she receive?

103. Exercise:

1. Sometimes letters are used to write numbers; then the first twelve numbers are written:

I	II	III	IV or IIII	V	VI
1	2	3	4	5	6
VII	VIII	IX	X	XI	XII
7	8	9	10	11	12

I, II, III, IV, and so on, are called **Roman numerals.**

1, 2, 3, 4, and so on, are called **Arabic numerals.**

2. Study the table given above and then say the right numbers where the blanks are:

I means —
II means — and —
III means — and — and —
VII means — and —
X means —
XI means 1 more than —

V means —
IV means — less than 5
VI means — and —
VIII means — and —
IX means 1 less than —
XII means — and —

3. Read:

II IV XI X XII I V III VIII VI IX VII

4. Write these numbers in Roman numerals:

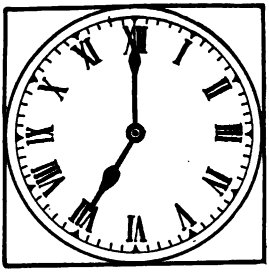
5 1 9 6 4 3 2 12 11 10 8 7

5. Read the page numbers of the front pages of this book.

6. Look at the faces of several clocks and watches and tell the class what kind of numerals you saw.

104. Exercise:

1. On a clock that has two hands, the long hand is called the **minute hand** and the short hand, the **hour hand**.



2. When the minute hand points to XII, the hour hand tells the hour.

3. The time by this clock is 7 o'clock.

4. What is the time when the minute hand points to XII and the hour hand points to:

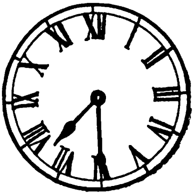
I? V? X? II? III? VI? IX? IV? XI? XII? VIII?

5. Count the numbers around the clock face starting at I; how many are there?

6. How many are $\frac{1}{2}$ of them? $\frac{1}{4}$ of them?

7. Counting to the right, what is the sixth number from XII?

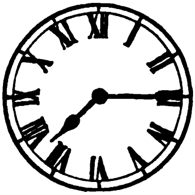
8. To what does the minute hand point at 7 o'clock? the hour hand?



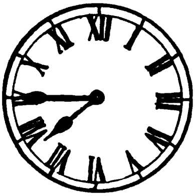
9. On this clock the minute hand has moved from XII to VI; and the hour hand is between VII and VIII. The time shown is *half past* 7 o'clock.

10. To what number does the minute hand point at half past 8 o'clock?

105. Exercise:



1. On this clock the minute hand has moved from XII to III; and the hour hand is between VII and VIII. The time shown is *a quarter past* 7 o'clock.



2. On this clock the minute hand has moved to the right from XII to IX, and the hour hand is between VII and VIII. The time shown is *a quarter of* 8 o'clock.

3. Tell where the minute hand and the hour hand are pointing when the time is: half past three; a quarter past five; a quarter of two; a quarter past nine.

4. Draw clock faces with the hands showing: half past one; a quarter past nine; a quarter of eleven.

5. Two hours after 12 o'clock is what time?

6. Two hours after 8 o'clock is what time? one hour after half past 1 o'clock?

7. Clara started from home on an errand at 3 o'clock and returned in half an hour; at what time did she return?

8. Samuel's father told him that at 4 o'clock he might play for an hour. When was his time up?

9. James walks from home to school in half an hour. At what time must he leave home to reach school by 9 o'clock?

106. Exercise:

1. Name at sight *2 times*, then *3 times*, then *4 times*, then *5 times* each of these numbers:

2 4 1 3 5 6 9 7 10 8

2. Name $\frac{1}{2}$ of: 2; 6; 4; 10; 8; 14; 12; 16; 20; 18.

3. Name $\frac{1}{3}$ of: 6; 3; 9; 15; 12; 18; 30; 24; 27; 21.

4. Name $\frac{1}{4}$ of: 12; 4; 8; 20; 16; 40; 32; 28; 24; 36.

5. Name $\frac{1}{5}$ of: 10; 15; 5; 25; 40; 50; 20; 35; 30; 45.

When You Have Finished This Chapter You Should Be Able to:

1. Count between 1 and 999 from any number to any other, forwards and backwards.

2. Read and write any number of *one, two* or *three,* figures, and copy such numbers correctly and quickly from a printed list, or as your teacher reads them.

3. Name instantly any of the sums asked for on pages 10 and 25 and any of the differences of page 29, and work correctly and quickly any example like those on pages 34–43.

4. Tell about, and use when possible, such measures as those on pages 60, 62, and 64.

5. State at sight the answer to any example in exercise 106 of this page.

6. Use, when it is called for in your everyday activities, anything you have learned in this chapter.

CHAPTER II

To the Teacher. Review carefully Chapter I, especially the part beginning page 19.

Reading and Writing Numbers

1. Exercise — Review:

1. Begin at 56 and count *56, 57, 58,* and so on to *99.*

2. Begin at 56 and count *56, 55, 54,* and so on to *1.*

3. Count by tens from 10 to 90; from 90 to 10.

4. Read the numbers in example 3, page 22.

5. Ten tens make what number? Write it in figures.

6. Count by hundreds to 900; from 900 to 100.

7. Write all numbers of two figures that end in 0; 1; 2; 3; 4; 5; 6; 7; 8; 9.

8. Read across; read down:

123	713	983	990	786	810
231	900	398	706	986	801
321	999	837	401	844	570
101	456	645	564	262	507

9. Write in figures the numbers in example 8 as your teacher *dictates* them; that is, as she reads them.

10. In a number of three figures what is the first figure, counting from the right, called? the second? the third?

2. 1. *Ten hundreds* make **one thousand,** written **1000.**

2. Read and then write from dictation:

2000; 5000; 3000; 7000; 9000; 4000; 6000; 8000.

3. *One thousand* and *one* make **one thousand one,** written **1001.**

Count from 1001 to 1009; write each number.

4. *One thousand* and *ten* make **one thousand ten,** written **1010.**

Count by tens from 1010 to 1090; write each.

5. *One thousand* and *one hundred* make **one thousand one hundred,** written **1100.** This may be read *eleven hundred.*

Read; then write from dictation:

1200; 1500; 1300: 1700; 1900; 1400; 1600; 1800.

In a number of four figures the fourth, counting from the right, is called the **thousands'** figure.

6. The number *8 thousand 6 hundred 59* is written *8659.* What is the units' figure? the tens' figure? the hundreds' figure? the thousands' figure?

Read, and write from dictation:

5248 7576 2127 8762 4027 3120
7656 9768 4006 8788 1776 1921
4200 5009 9090 6777 3812 9999

7. Bring to school and read to the class five numbers of four figures each that you have seen. Read numbers on automobile license tags. Tell where you saw the numbers you bring.

The Forty-Five Elementary Sums

3. Exercise — Review:

Name the sums at sight:

3	4	3	6	1	8	2	4	8	4	5	6	5	6	7
2	2	3	3	1	4	2	3	3	4	3	4	2	6	1
9	8	8	9	4	5	8	6	7	5	9	7	9	8	9
4	5	2	1	1	4	1	2	5	1	2	7	7	7	9
3	9	6	7	2	7	7	9	5	6	7	8	9	9	8
1	6	5	3	1	2	4	3	5	1	6	6	5	8	8

An excellent third grade record for the 45 correct sums is 45 seconds.

Eighty Important Elementary Differences

4. Exercise — Review (See example 4, page 29):

Subtract each number at the right from each number on the same line; name results only.

4	12	10	5	8	11	6	7	9	13	4
12	3	6	10	7	4	9	11	5	8	3
3	10	4	8	2	11	6	9	5	7	2
14	7	11	16	9	13	8	12	10	15	7
8	15	9	13	11	7	12	6	14	10	6
14	17	9	11	15	12	10	8	16	13	8
10	13	8	5	11	6	9	12	7	14	5
11	17	14	16	9	13	10	15	12	18	9

A Number of One Figure to a Number of Two Figures

5. Exercise (Review pages 34 and 38):

1. Add:

Group I	3		30
	2		10
	4		50
	7		80
	1	to	90
	6		20
	8		40
	5		60
	9		70

Add 3 to each number in the right-hand column, saying answers only. Thus, *33*, *13*, *53*, and so on. Then add 2 to each number in the right-hand column; then 4, and so on until you have added each number in the left-hand column to each number in the right-hand column.

Group II	3		31
	2		11
	4		51
	7		81
	1	to	91
	6		21
	8		41
	5		61
	9		71

Change the last figure of each number in the right-hand column of Group I to 1, as shown in Group II, and add as before; then change it to 2 and add; then to 3 and add; and so on.

When you can name these sums at sight — there are 810 of them — and also the 45 elementary sums, you are prepared to add quite long columns.

To the Teacher. The importance of drilling for mastery over the 810 combinations in this exercise is apparent when it is observed that most of the combinations involved in adding columns are those of a number of one figure to a number of one figure — one of the 45 elementary combinations, — or a number of one figure to a number of two figures — one of the combinations provided for in this exercise.

2. Begin at 11 and count by 4's to 51; thus, *11*, *15*, *19*, and so on.

Combinations of More than Two Numbers of One Figure Each

6. Exercise :

Add and check. How many sums can you get right in 1 minute? Who of the class can get the greatest number of right answers in 4 minutes?

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	2	3	4	3	5	4	6	7	8	7
	5	4	4	3	5	4	3	3	2	3
	4	5	3	4	2	5	2	4	5	3
2.	5	7	8	7	5	8	4	3	5	7
	6	6	3	6	4	3	8	9	8	7
	7	5	9	8	9	8	9	9	8	8
3.	6	8	7	6	2	7	8	6	8	7
	7	8	7	5	7	8	3	7	5	5
	6	4	5	8	6	3	2	5	3	8
4.	8	8	9	8	7	8	6	8	9	7
	1	3	3	7	3	2	5	4	6	2
	7	2	4	2	3	4	3	3	1	3
	1	2	2	1	3	1	1	2	2	3
5.	3	7	6	7	9	8	9	5	8	9
	8	6	8	8	7	6	5	9	8	9
	5	5	4	5	8	7	6	6	3	4
	3	4	3	2	1	2	3	2	5	4

TO THE TEACHER. In this, and other exercises like it, the pupil may write the answers on a sheet of paper placed beneath a row of examples.

The Sum in Any Column, Less than Ten

7. Add 324 and 543.

324 3 units + 4 units = 7 units. Write 7.
543 4 tens + 2 tens = 6 tens. Write 6.
867 5 hundreds + 3 hundreds = 8 hundreds. Write 8.
The sum is *867*. *Check:* Add downwards.
In practice think: 3, 7 (write 7); 4, 6 (write 6); 5, 8 (write 8).

8. Exercise (Review page 35):

Copy, and add upwards; check by adding downwards:

	a	*b*	*c*	*d*	*e*	*f*	*g*
1.	42 11	56 23	28 31	43 36	35 40	37 22	63 36
2.	20 45 24	14 22 52	33 22 32	22 34 42	31 26 32	25 24 50	11 34 43
3.	111 222	336 201	424 342	235 534	445 324	352 437	543 245
4.	387 512	258 741	340 635	326 362	500 300	604 203	716 282
5.	708 260 31	321 372 305	321 432 146	421 243 324	176 212 311	222 333 444	333 333 333

6. Make 10 examples like the above. Add and check.

The Sum in Any Column not Restricted

9. Add 456 and 278.

456 8 units + 6 units = 14 units = 1 ten + 4 units. Write 4.
278 1 ten + 7 tens + 5 tens = 13 tens = 1 hundred + 3 tens. Write 3
734 1 hundred + 2 hundred + 4 hundred = 7 hundred. Write 7.

The sum is *734*. *Check:* Add downwards.

In practice think: 8, 14 (write 4); 1, 8, 13 (write 3); 1, 3, 7 (write 7).

10. Exercise (Review page 39):

Add upwards; check by adding downwards:

	a	*b*	*c*	*d*	*e*	*f*	*g*
1.	37 56	73 18	47 54	38 76	49 54	56 75	66 49
2.	48 56	53 67	77 66	75 75	86 76	69 88	75 86
3.	48 97	89 76	79 54	98 99	99 97	89 99	76 99
4.	82 20 19	58 67 38	27 14 96	17 9 17	37 56 25	83 9 17	48 32 76
5.	376 348	432 269	725 185	638 297	843 197	279 874	562 538
6.	127 346 428	176 429 416	386 201 314	309 147 348	246 834 157	348 497 259	288 398 478

11. Exercise:

1. Gladys, May, and Anna sold Red Cross Christmas seals. Gladys sold 48, May sold 56, and Anna sold 62; how many did they all sell?

48 was the number Gladys sold.
56 was the number May sold.
62 was the number Anna sold.
? was the number they all sold.

2. This year Louise attended Sunday School 22 times and Esther attended 11 more times than Louise; how many times did Esther attend?

3. A gardener set out 56 cabbage plants on Monday and 64 on Tuesday; how many did he set out on both days?

4. A man in one day sold 36 cows, 42 hogs, and 21 sheep; how many animals did he sell that day?

5. Frank put 44 cents in the school savings one week, 32 cents another week, and 14 cents another week; how many cents did he put in the school savings in the three weeks? He saved how many dimes in the three weeks?

6. How many persons were in a car if there were in it 34 men, 27 women, and 19 children?

7. Elsie, Janet, and Ruth sold sandwiches at a party given to raise money for the hospital in their town. Elsie sold 46, Janet sold 38, and Ruth sold 58. How many sandwiches did they all sell?

12. Exercise:

1. Sara weighs 56 pounds, Margaret, 67 pounds, and Helen, 75 pounds; how much do they all weigh?

56 pounds is Sara's weight.
67 pounds is Margaret's weight.
75 pounds is Helen's weight.
? pounds is the weight of all.

2. Mr. Hatch bought a fire shovel for 15 cents, a coal bucket for 45 cents, and a poker for 15 cents; how much did he pay for all?

3. Find the cost of a 45-cent broom, a 15-cent scrubbing brush, and a 25-cent dust brush.

4. A farmer thrashed 175 bushels of wheat, 268 bushels of oats, and 45 bushels of rye; how much grain did he thrash?

5. Find the weight of three calves if one weighed 126 pounds, another 132 pounds, and the third 148 pounds.

6. I bought a book bag for 65 cents, a lunch box for 25 cents, and a tablet for 8 cents. How much did I pay for all?

7. Fred sold 21 bunches of onions from his home garden on Monday, 18 bunches on Tuesday, and 24 bunches on Wednesday. How many bunches did he sell in the three days?

8. A boy's sales of papers during a week were: Monday, 98 papers; Tuesday, 78 papers; Wednesday, 66 papers; Thursday, 53 papers; Friday, 49 papers; and Saturday, 87 papers; how many did he sell that week?

A Number of One Figure from a Number of Two Figures

13. Exercise:

1. Count *20, 18, 16,* and so on to 0.
2. Count *21, 19, 17,* and so on to 1.
3. Count *30, 27, 24,* and so on to 0.
4. Count *31, 28, 25,* and so on to 1.
5. Count *32, 29, 26,* and so on to 2.

6. Name at sight what you must add to each of these numbers to make 25; to make 29; to make 30:

3 5 1 8 6 4 2 7 9

7. Name at sight what you must add to each of these numbers to make 28; to make 26; to make 50:

5 1 4 2 3 6 8 9 7

2		19
4		39
1		29
3		79
8	from	69
7		89
6		49
5		59
9		99

8. Subtract 2 from each number in the right-hand column, saying answers only. Thus, *17, 37, 27,* and so on. Then subtract 4 from each number in the right-hand column, and so on until you have subtracted each number in the column to the left from each number in the column to the right.

9. Change the last figure in each number in the right-hand column to 8 and subtract as before; then to 7 and subtract, and so on, until you have subtracted any number of one figure from any number of two figures.

The Lower Number in Each Column Less than the Upper

14.

$$\begin{array}{r} 978 \\ \underline{354} \\ 624 \end{array}$$

$8 - 4 = 4$. Write 4.
$7 - 5 = 2$. Write 2.
$9 - 3 = 6$. Write 6.

Say: 4 from 8 leaves 4; 5 from 7 leaves 2; 3 from 9 leaves 6.

The difference is *624*. *Check:*

$$\begin{array}{r} 354 \\ \underline{624} \\ 978 \end{array}$$

To the Teacher. See "To the Teacher," page 41.

15. Exercise (Review page 41):

Subtract and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*
1.	36 20	56 12	44 22	35 23	98 33	67 42	59 41
2.	57 23	38 17	86 52	65 32	98 24	87 24	79 57
3.	465 123	387 143	425 213	556 232	978 662	688 135	679 145
4.	676 405	328 110	999 345	758 34	899 354	876 321	987 654
5.	477 351	379 168	152 141	276 135	978 341	879 546	978 262

Make a list of 10 examples like those in this exercise, subtract, and check.

The Lower Number in One Column, or More than One Column, Greater than the Upper

16. Subtract 256 from 834.

834
256
578

(1) *Think:*		or	(2) *Think:*	
14 − 6 = 8.	Write 8.		14 − 6 = 8.	Write 8.
12 − 5 = 7.	Write 7.		13 − 6 = 7.	Write 7.
7 − 2 = 5.	Write 5.		8 − 3 = 5.	Write 5.

Check: 256
578
834

Remark. In (1) 834 is thought of as 7 hundreds + 12 tens + 14 units. In (2) the minuend is increased by 10 and the subtrahend by 1 ten; again, the minuend is increased by 10 tens and the subtrahend by 1 hundred. Equally increasing the minuend and subtrahend does not change the difference.

17. Exercise (Review page 43):

Subtract and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*
1.	52 13	65 27	48 29	85 57	37 29	85 68	83 29
2.	42 27	74 56	40 17	51 27	67 39	52 28	74 39
3.	186 28	192 49	228 189	374 185	756 457	525 289	870 296
4.	705 296	310 105	834 528	657 588	681 589	820 463	711 284

Make a list of 10 examples like those in this exercise, subtract, and check.

18. Exercise (Check your answers):

1. William weighs 107 pounds and John weighs 76 pounds. Find the difference in their weights.

$$\begin{array}{rl} 107 & \text{pounds is William's weight.} \\ \underline{\ \ 76} & \text{pounds is John's weight.} \\ ? & \text{pounds is the difference of their weights.} \end{array}$$

2. My father's age is 42 years and mine is 9 years; in how many years will I be as old as he is now?

3. Frances had 48 cents. She bought a Christmas wreath for 30 cents. How much money had she left? How much will she still have left if she buys her baby sister a 15-cent toy?

4. Father gave my brother and me 50 cents apiece. After spending some of this money, my brother had 28 cents of his left and I had 32 cents of mine. How much did he spend? How much did I spend? I told father just how much more my brother spent than I did; how much was that?

5. My brother is reading a book of 150 pages. He has read 79 pages; how many pages has he yet to read?

6. Emily has a collection of 426 postcards; how many more must she get to have 500?

7. George weighs 62 pounds. How much weight must he gain to weigh 100 pounds?

8. There are 211 words on page 54 of Dorothy's reader, and 178 words on page 58; how many more words are there on page 54 than on page 58?

19. Exercise (Check your answers):

1. James counted 65 animals in a field; 48 of them were cows and the rest were sheep. How many were sheep?

65 was the number of animals in the field.
48 was the number of cows in the field.
? was the number of sheep.

2. Lucy invited 40 of her friends to a picnic, but 12 of them did not come. How many of them came?

3. A boy had 75 papers for sale and sold all of them but 18. How many did he sell?

4. A farmer wishes to plant 60 rows of potatoes; he has already planted 24 rows; how many rows has he yet to plant?

5. A builder had 36 houses for sale and sold all of them but 18; how many did he sell?

6. One engine was pulling 60 cars and another 38 cars; how many more cars were there in the one train than in the other?

7. Last month mother bought 62 quarts of milk. This month she bought 45 quarts. How many more quarts did she buy last month than this month?

8. There were 216 pupils in a certain school; 126 of them were girls. How many were boys?

9. Grace's mother bought a box of 200 pieces of loaf sugar on Monday morning. By the next Sunday evening the family had used it all but 24 pieces. How many pieces did they use during that week?

20. Letters instead of figures are often used in writing numbers. This method of writing numbers is called the **Roman system.** Some of the letters used are:

I = 1 V = 5 X = 10 L = 50 C = 100

21. **Table**

The Units:

I	II	III	IV	V	VI	VII	VIII	IX
1	2	3	4	5	6	7	8	9

The Tens:

X	XX	XXX	XL	L	LX	LXX	LXXX	XC
10	20	30	40	50	60	70	80	90

22. **Exercise:**

1. Write after X each of the units in turn, and read the numbers formed; thus: XI, XII, and so on to XIX; read *11*, *12*, and so on to *19*.

2. Write after XX each of the units in turn and read the numbers formed.

3. Write by the Roman system the numbers between: XXX and L; L and LXX; LXX and C.

4. Write in figures:

XIV; XVI; XIX; XXII; XXV; XXVIII; XXIX; XXXVII; XL; XLI; XLIX; LIX; LXVI; LXX; LXXXV; LXXXIX; XC; XCV; XCIX; C.

23. **Table**

10 cents = 1 dime
25 cents = 1 quarter dollar
50 cents = 1 half dollar
100 cents = 1 dollar
10 dimes = 1 dollar

3 dollars may be written *$3*; *5 cents* may be written *5 c*, *5¢*, or *5 ct.* The sign $ is called the *dollar sign.*

24. Exercise:

1. Read these prices:

Toy bank, 50¢
Pocket knife, 75¢
Bar pin, $2
Toy piano, $6
Boy's airplane, $4
Child's handbag, $2
Scarf, $5
Cooking set, $2
Wool mittens, 75¢

Boy's sweater, $5
Thrift stamp, 25¢
Boy's shoes, $6
Toy parasol, 25¢
Doll's cradle, 47¢
Doll's suitcase, $1
Roller skates, $3
Hair ribbon, 54¢
Book, 69¢

2. Write with the dollar sign:

6 dollars
150 dollars
1 dollar
27 dollars
20 dollars
500 dollars
50 dollars
201 dollars

3. Write, using *c*:

1 cent
25 cents
5 cents
75 cents
10 cents
45 cents
50 cents
66 cents

25. *2 dollars 45 cents* is written $*2.45*, and *5 dollars 6 cents* is written $*5.06*. *45 cents* may be written $*0.45*. *2 dollars* may also be written $*2.00*.

In writing a sum of money consisting of dollars and cents, the point which is written between the number of dollars and the number of cents is called the *decimal point*. If the number of cents is less than ten, a cipher is written between the decimal point and the number of cents.

26. Exercise:

1. Write, using the dollar sign:

5 dollars
35 cents
7 dollars 10 cents
9 dollars 90 cents
1 dollar 7 cents
5 dollars 75 cents

2. Read; then write from dictation:

$ 3.35
$ 7.25
$ 15.09
$ 5.80
$ 6.07
$ 28.25
$ 10.42
$ 50.50
$ 16.04
$ 5.75
$ 3.08
$ 0.75
$ 4.50
$ 0.37
$ 3.08

3. One nickel is worth how many cents?

4. Two nickels are worth what piece of money?

5. Two dimes and what piece of money are worth 25 cents? What two pieces of money are worth 15 cents?

6. Name our four pieces of silver money.

7. A half dollar is worth how many quarter dollars?

8. A dollar is worth how many half dollars? how many quarter dollars? how many dimes?

9. A half dollar is worth how many dimes?

10. A quarter dollar is worth how many nickels?

Addition

27. Add $1.75, $3.86, and $4.08.

$ 1.75
3.86
4.08
$ 9.69

Write the amounts so that the decimal points shall stand in a column.

Add as in ordinary numbers.

Place the decimal point in the sum before the last two figures.

28. Exercise:

Read, copy, and add:

	a	*b*	*c*	*d*	*e*	*f*
1.	$0.10	$1.34	$4.05	$0.25	$0.86	$3.60
	1.45	2.06	1.39	3.15	5.34	4.00
2.	$2.79	$5.00	$6.23	$3.72	$6.96	$7.48
	3.50	2.00	1.98	4.54	2.04	1.61
3.	$3.65	$7.29	$2.36	$5.41	$3.85	$4.39
	1.30	2.51	5.01	1.55	2.94	2.78
	2.00	0.11	1.60	1.00	2.86	1.86

Find the cost of all:

4.		
	1 saw	$1.25
	1 rake	.75
	1 pair shears	2.25
	Total	

5.		
	1 thermometer	$1.50
	1 watering can	1.60
	1 glass cutter	3.00
	Total	

6.	Frank's purchase:	
	1 fountain pen	$2.25
	1 pennant	.75
	1 tablet	.12
	Total	

7.	Ann's purchase:	
	1 scarf	$3.25
	1 card buttons	.50
	1 hair ribbon	.75
	Total	

Subtraction

29. Subtract $1.75 from $8.60.

$ 8.60 1.75 $ 6.85	Write the amounts so that the decimal points shall stand in a column. *Check :* $ 6.85 + $ 1.75 = $ 8.60.

30. Exercise:

Read, copy, and subtract; check results:

	a	*b*	*c*	*d*	*e*	*f*
1.	$ 9.28 4.53	$ 4.55 3.47	$ 7.19 2.29	$ 5.62 4.39	$ 8.46 5.68	$ 10.25 3.98
2.	$ 6.50 4.18	$ 1.09 0.50	$ 4.66 2.77	$ 3.00 1.75	$ 7.05 6.25	$ 11.56 7.29
3.	$ 8.46 4.55	$ 4.77 2.75	$ 9.98 8.05	$ 7.65 5.42	$ 8.00 4.06	$ 25.00 7.15

4. Nora has saved $ 1.23; how much more does she need to buy a registering bank for $ 2.50?

5. Charles has saved $ 3.72; how much more does he need to buy an electric train for $ 5.98?

6. Ruth has saved $ 2.28. She wishes to buy a character doll for $ 4.25; how much more does she need?

7. William wishes to buy a Brownie camera for $ 5.97. He has saved $ 3.75; how much more does he need?

8. Which child must increase its savings most to make its purchase? The cost of the four above articles is how much greater than the sum of the children's savings?

Making Change

31. Rebecca bought a basket for 34¢ and gave the storekeeper in payment a half dollar. He counted out her change thus: "34, 35, 40, 50." 34¢ was the amount of her purchase; he gave her 1¢ as he said "35," a 5¢ piece as he said "40," and a dime as he said "50." Did Rebecca receive the right amount of change, and how much did she receive?

32. Exercise:

To THE TEACHER. Real money should be used, if it is convenient.

Count out the right change in each of these purchases, using as few pieces of money as possible, and state how much change is given:

	Purchases		Money Paid	Change
1.	Animal blocks,	19¢	quarter dollar	?
2.	Doll's furniture set,	32¢	half dollar	?
3.	Coin bank,	59¢	75¢	?
4.	Map,	62¢	75¢	?
5.	Bicycle whistle,	21¢	3 dimes	?
6.	Post card album,	69¢	dollar	?
7.	Tin dishes,	9¢	half dollar	?
8.	Electric engine,	$1.10	$2 bill	?
9.	Flag,	$1.50	$2 bill	?
10.	Camera,	$3.50	$5 bill	?
11.	Fountain pen,	$2.35	$5 bill	?

12. Bring to class two examples like those of this exercise, telling of purchases you made, the money you paid, and the change given you.

33. Exercise:

1. Point to the north; the south; the east; the west.

2. Look at the map on this page. For what does each of the letters N, E, W, and S stand?

3. Look at the map and tell what direction Clara's house is from May's; Frank's from Clara's; Don's from Frank's; Ruth's from Don's; the school from Ruth's.

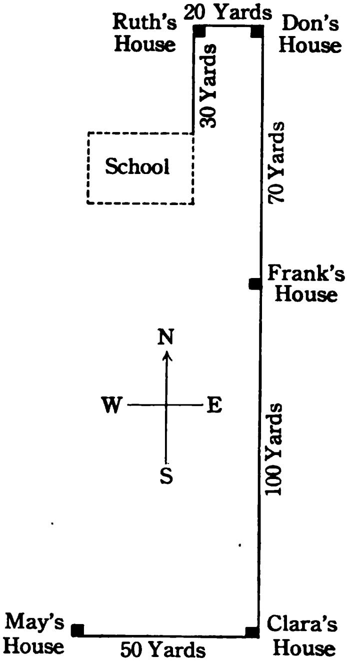
The heavy lines of the map show the streets along which these children walk from one house to another and to and from school.

4. How far must May walk from her house to reach Frank's? to reach Don's? to reach Ruth's?

5. How far must Clara walk from her house to reach Ruth's?

6. How far does Ruth walk to school? How far does Don walk? How far does Frank walk? How far does Clara? How far does May?

7. To reach home from school, Frank must walk how many more yards than Don? May must walk how many more yards than Clara? Clara must walk how many more yards than Don?



MAP

34. Exercise:

1. Read: Some of California's giant trees are nearly 4000 years old.

Supply the missing numbers:

2. 20 units = — tens; 50 units = — tens. How many units in 30? in 40? in 80? How many tens in each?

3. 25 units = — tens and — units. How many tens and units in 35? in 75? in 55?

4. Look at these numbers and name two whose sum is 9. Can you name another pair whose sum is 9? Name all the pairs whose sum is 9.

1 2 3 4 5 6 7 8

5. Look at the numbers above and name two whose sum is 10. Name all the pairs whose sum is ten.

6. What is the sum of 1, 2, 3, 4, 5, 6, 7, 8, and 9?

7. Count *4, 8, 12,* and so on to 40. Count *40, 36, 32,* and so on to 0. Count by 4's from 40 to 80.

8. Count *5, 10, 15,* and so on to 50. Count *50, 45, 40,* and so on to 0. Count by 5's from 50 to 75.

9. Name all the numbers from 19 to 99, of which the last figure is 9.

Here is what mother bought:

One Day

10.	1 dozen eggs,	$0.80
	1 loaf of bread,	0.14
	2 quarts of milk,	0.28
	1 pound of sugar,	0.11
	Total	

Another Day

11.	1 pound of butter,	$0.75
	1 pound of coffee,	0.40
	1 loaf of bread,	0.14
	2 quarts of milk,	0.28
	Total	

Multiplying by 2 and by 3

35. You have already built these tables and studied them (see pages 49 and 52). Learn them now so well that you can repeat them without making a mistake.

36. **Tables**

$2 \times 1 = 2$	$3 \times 1 = 3$
$2 \times 2 = 4$	$3 \times 2 = 6$
$2 \times 3 = 6$	$3 \times 3 = 9$
$2 \times 4 = 8$	$3 \times 4 = 12$
$2 \times 5 = 10$	$3 \times 5 = 15$
$2 \times 6 = 12$	$3 \times 6 = 18$
$2 \times 7 = 14$	$3 \times 7 = 21$
$2 \times 8 = 16$	$3 \times 8 = 24$
$2 \times 9 = 18$	$3 \times 9 = 27$
$2 \times 10 = 20$	$3 \times 10 = 30$

$2 \times 0 = 0$ $3 \times 0 = 0$ **Any number × 0 = 0**

37. Exercise:

1. How many are:

two 1's? three 1's? two 5's? three 5's? two 10's?
three 10's? two 2's three 2's? three 3's? two 3's?
two 4's? two 6's? three 6's? three 4's? two 8's?
three 8's? three 7's? two 7's? two 9's? three 9's?

2. Count by 2's to 20; by 3's to 30.

3. Write $1 \times 2 = 2$; $2 \times 2 = 4$; $3 \times 2 = 6$; and so on to $10 \times 2 = 20$. Learn this table.

4. Write $1 \times 3 = 3$; $2 \times 3 = 6$; $3 \times 3 = 9$; $4 \times 3 = 12$; and so on to $10 \times 3 = 30$. Learn this table.

38. Exercise:

What is the cost of:

1. 2 one-cent post cards?
2. 3 one-cent stamps?
3. 5 two-cent post cards?
4. 3 five-cent stamps?
5. 2 nickels are worth how many cents?
6. How many horses will make 2 two-horse teams?
7. How many children are there in 2 classes of 10 children each? In 3 classes of 10 children each?
8. How many persons are there at 3 tables, if there are 6 persons at each table? 9 persons at each table?
9. How many horses are there in 3 stables, if there are 6 horses in each stable?
10. A 3-story building, 10 rooms to the story, has how many rooms?
11. 3 windows require how many panes of glass, 4 panes to the window? 8 panes to the window?
12. How many cabbage plants are there in 3 rows, if each row contains 8 cabbage plants?
13. 3 persons each pay 5 cents car fare; how much do they all pay? How much if each pays 6 cents car fare?

Tell the cost of 2 of each; then of 3 of each:

14. Nutmegs, 1¢.
15. Rolls of lunch paper, 6¢.
16. Chocolate bars, 2¢.
17. Packages of biscuits, 7¢.
18. Oranges, 3¢.
19. Spools of silk, 8¢.
20. Bananas, 4¢.
21. Bars of laundry soap, 9¢.
22. Sacks of salt, 5¢.
23. Loaves of bread, 10¢.

39. Exercise — Review:

Copy, supplying the missing numbers:

1. 2 × 2 = —
2. 2 × — = 2
3. 2 × 3 = —
4. 3 × 8 = —
5. 2 × — = 18
6. 2 × 6 = —
7. 2 × 7 = —
8. 2 × — = 12
9. — × 5 = 10
10. 3 × 3 = —
11. 3 × 6 = —
12. 2 × — = 14
13. 2 × — = 6
14. 3 × 4 = —
15. 3 × — = 24
16. 2 × — = 4
17. — × 1 = 2
18. 2 × 8 = —
19. — × 9 = 27
20. 2 × — = 10
21. 3 × 9 = —
22. 3 × 5 = —
23. 3 × 7 = —
24. — × 3 = 6
25. — × 8 = 24
26. — × 1 = 3
27. — × 6 = 12
28. — × 4 = 8
29. 2 × 1 = —
30. — × 2 = 6
31. 3 × — = 6
32. 3 × — = 21
33. 3 × — = 9
34. 2 × — = 8
35. 2 × 4 = —
36. 3 × — = 27
37. 2 × 5 = —
38. — × 9 = 18
39. — × 4 = 12
40. — × 2 = 4
41. — × 5 = 15
42. — × 8 = 16
43. 3 × — = 3
44. 3 × 2 = —
45. 2 × 10 = —
46. — × 6 = 18
47. 2 × 9 = —
48. — × 10 = 30
49. 2 × — = 16
50. 3 × — = 12
51. — × 10 = 20
52. — × 3 = 9
53. — × 7 = 14
54. 2 × — = 20
55. 3 × — = 15
56. 3 × 1 = —
57. 3 × 10 = —
58. — × 7 = 21
59. 3 × — = 18
60. 3 × — = 30

Read exercise 39, supplying the missing numbers at sight. Who in the class can do this in the least time? Read from left to right; then down the columns.

Multiplying Numbers of Two and Three Figures by 2 and 3

40. $232 + 232 + 232 = 3 \times 232$. (See table, page 92.)

$$\begin{array}{r} 232 \\ 3 \\ \hline 696 \end{array}$$

3 × 2 units = 6 units; write 6 in units' place.
3 × 3 tens = 9 tens; write 9 in tens' place.
3 × 2 hundreds = 6 hundreds; write 6 in hundreds' place.
The answer is *696*.

In practice think: 3 times 2 are 6; 3 times 3 are 9; 3 times 2 are 6.

Here we have **multiplied** 232 by 3. We call 696 the **product**.

Check:

$$\begin{array}{r} 232 \\ 232 \\ 232 \\ \hline 696 \end{array}$$

41. Exercise:

Copy, multiply, and check:

	a	*b*	*c*	*d*	*e*	*f*
1.	11 2	12 2	22 2	13 2	23 2	20 2
2.	34 2	30 2	44 2	40 2	50 2	11 3
3.	21 3	20 3	22 3	30 3	32 3	33 3
4.	111 2	121 2	123 2	101 2	132 2	243 2
5.	432 2	302 2	414 2	333 2	444 2	403 2
6.	111 3	121 3	202 3	231 3	101 3	103 3
7.	222 3	301 3	133 3	323 3	303 3	333 3

Dividing by 2 and by 3

(Review pages 51 and 54.)

42. $\frac{1}{2}$ of 6 = 3; also, 3 tells how many 2's there are in 6.

||| ||| || || ||

The answer to *What is $\frac{1}{2}$ of 6?* is also the answer to *How many 2's are there in 6?*

Finding $\frac{1}{2}$ of 6 or how many 2's there are in 6 is called **dividing** 6 by 2. We call the answer *3* the **quotient.**

6 divided by 2 is 3 may be written *6 ÷ 2 = 3*, or $2\overline{)6}$
Check: 2 × 3 = 6. 3

43. Exercise:

1. What is $\frac{1}{2}$ of 6? 8? 10? 12? 14? 16? 18? 20?
2. What is $\frac{1}{3}$ of 9? 12? 15? 18? 21? 24? 27? 30?

Copy, and write the proper number after =:

3. 4 ÷ 2 = 4. 18 ÷ 3 = 5. 6 ÷ 2 = 6. 14 ÷ 2 =
7. 3 ÷ 3 = 8. 20 ÷ 2 = 9. 9 ÷ 3 = 10. 21 ÷ 3 =
11. 2 ÷ 2 = 12. 30 ÷ 3 = 13. 6 ÷ 3 = 14. 16 ÷ 2 =

Copy, and write the proper number under the line; check:

15. $2\overline{)8}$ 16. $3\overline{)24}$ 17. $2\overline{)12}$ 18. $2\overline{)10}$
19. $3\overline{)12}$ 20. $3\overline{)27}$ 21. $2\overline{)18}$ 22. $3\overline{)15}$

23. Read examples 3–22, naming at sight the answers.

Say the right number where each line is:

	a	*b*	*c*	*d*
24.	12 = — 2's	12 = — 3's	14 = — 2's	15 = — 3's
25.	16 = — 2's	18 = — 3's	24 = — 3's	21 = — 3's
26.	30 = — 3's	20 = — 2's	18 = — 2's	27 = — 3's

44. Exercise:

1. Tell at sight how many 2's there are in 4; 3's in 6. What is $\frac{1}{2}$ of 10? $\frac{1}{2}$ of 20? $\frac{1}{2}$ of 16? $\frac{1}{3}$ of 15? $\frac{1}{3}$ of 30?

2. $\frac{1}{2}$ of a dozen are how many? $\frac{1}{3}$ of a dozen?

3. 18 pails were tied in 2 bundles of the same size; how many pails were there in a bundle?

4. 30 children were formed into 3 classes of the same size; how many were there in each class?

5. How many 2-horse teams can be formed with 4 horses? with 6 horses? with 12 horses?

6. How many 3-foot ropes can be cut from a rope 6 feet long? from a rope 15 feet long?

7. 2 boys divide 6 cents equally between them; what part of the money does each receive? How much does each receive?

8. A girl who earns $24 a week spends $\frac{1}{3}$ of it for board; how much is her board per week?

9. If two quarts of vinegar cost 20 cents, how much was that a quart?

10. A log 9 feet long will make how many 3-foot pieces?

11. I wish to have 30 pounds of sugar put up in three packages of the same weight; how much must be put up in each package?

12. If I paid 24 cents for 3 tablets of the same kind, how much was that apiece?

13. Edna spent 20 cents for 2 pounds of sugar; how much was that a pound?

Dividing Numbers of Two and Three Figures by 2 and by 3

45. Divide 936 by 3.

3)936
312

9 hundreds ÷ 3 = 3 hundreds. Write 3 in hundreds' place.
3 tens ÷ 3 = 1 ten. Write 1 in tens' place.
6 units ÷ 3 = 2 units. Write 2 in units' place.

The answer is *312*. *Check:* 312
3
936

Think: 9 ÷ 3 (write 3); 3 ÷ 3 (write 1); 6 ÷ 3 (write 2).

0 ÷ 2 = 0 **0 ÷ 3 = 0** **0 ÷ any number = 0**

46. Exercise:

Copy, divide, and check:

1. 2)40 2. 3)60 3. 2)80 4. 3)90 5. 2)48
6. 2)42 7. 3)36 8. 2)28 9. 3)93 10. 3)39
11. 2)200 12. 3)300 13. 2)400 14. 3)600 15. 3)900
16. 2)242 17. 3)360 18. 2)284 19. 3)663 20. 3)939
21. 2)268 22. 3)336 23. 2)420 24. 5)630 25. 3)963
26. 2)202 27. 3)366 28. 2)462 29. 3)603 30. 3)909
31. 2)444 32. 3)333 33. 2)666 34. 3)696 35. 3)369
36. 2)864 37. 3)969 38. 2)468 39. 3)636 40. 3)999

41. 2)424 bushels
? bushels
42. 3)$630
$
43. 2)104 men
men
44. 3)303 days
45. 2)106 sheep
46. 3)693 pounds
47. 2)862 yards
48. 3)909 feet
49. 3)609 feet

47. Exercise:

1. What number comes next before:

800? 650? 590? 900? 720? 440? 899? 1000?

2. Write these numbers as your teacher dictates them and find their sum. Find the difference between the greatest and the least; between the other two.

875 706 970 1254

3. Find the sum of the numbers between 797 and 802.

4. Look at these numbers, then write the greatest of them and under it the least; subtract and check:

762 496 879 989 897 469

5. Count *2*, *5*, *7*, *10*, and so on, adding 2 and then 3 until you count to 40; to 45.

Name at sight the answers, reading from left to right, then down the columns:

	a	*b*	*c*	*d*
6.	2 × 6	2 × 4	2 × 7	2 × 9
7.	3 × 5	3 × 8	3 × 4	3 × 7
8.	2 × 8	2 × 5	3 × 6	3 × 9
9.	20 ÷ 2	16 ÷ 2	18 ÷ 3	12 ÷ 2
10.	2)10	2)18	2)14	3)15
11.	3)30	3)24	3)21	3)27

12. Complete these columns:

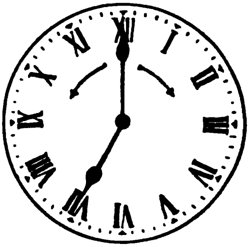
	+2	+3	+5
3	5	8	13
5	7	10	
7	9		
4			
2			
6			
9			
8			

13. 3 girls bought a basket of fruit for a schoolmate who was ill; it cost 90¢. Each girl paid the same sum; how much did each pay?

Telling Time

48. Exercise:

When the long hand, or **minute hand**, points to XII, the short hand, or **hour hand**, points to the hour.



1. What time does this clock show?

2. Start at I and count the numbers around the clock face; how many hours are shown?

3. Which arrow, the right or the left, shows which way the hands move?

4. Tell to what numbers the minute hand and the hour hand will point:

1 hour after 7 o'clock	2 hours after 7 o'clock
3 hours after 7 o'clock	4 hours after 7 o'clock

5. In what time does the minute hand move from XII to XII again?

The small spaces on the clock face are **minute spaces**.

6. Count the minute spaces on the clock face; tell how many of them the minute hand moves over in one hour.

Learn that:

60 minutes (min.) = 1 hour (hr.)

7. Tell to what number the minute hand points and between what two numbers the hour hand points when the time is: a quarter past 7; half past 7; a quarter to 8.

49. Exercise :

1. How many minute spaces are there from :

XII to III? XII to VI? IX to XII?

Read examples 2, 3, and 4, supplying the missing numbers:

2. A quarter past 7 is — minutes past 7.
3. Half past 7 is — minutes past 7.
4. A quarter to 8 is — minutes past 7.
5. What is the time when the hour hand points between VI and VII and the minute hand points to:

I? II? IV? V? VII? VIII? X? XI?

6. Learn to tell the time when the minute hand points to any one of the 60 minute spaces.

When the hour hand is between VII and VIII, and the minute hand points to X, the time is *10 minutes to 8*, which is the same as *50 minutes past 7*.

Read examples 7, 8, 9, and 10, supplying the missing numbers:

7. 20 minutes to 2 is — minutes past 1.
8. 10 minutes to 4 is — minutes past 3.
9. 5 minutes to 6 is — minutes past 5.
10. 25 minutes to 11 is — minutes past 10.

Nine forty, written *9.40*, is a short way of saying *40 minutes past 9*.

11. Read in two ways:

10.40; 1.50; 6.45; 7.55; 8.56; 4.48; 2.15; 5.37.

Noon, Forenoon, Afternoon

50. Exercise:

The time that a clock shows when both hands point to XII in the daytime is called **noon**; the time it shows when both hands point to XII at night is called **midnight**.

The time from midnight to noon is called **forenoon**; the time from noon to midnight is called **afternoon**.

A.M. stands for forenoon; P.M. stands for afternoon.

1. How many hours are there from midnight to noon? from noon to midnight?

2. How many hours are there from noon to noon again?

3. How many hours are there from midnight to midnight again?

From midnight to midnight again is **a day**.

24 hours (hr.) = 1 day (da.)

4. Tell which are in the forenoon and which in the afternoon:

6 A.M. 7 P.M. 9 P.M. 1 A.M.
1 P.M. 7.20 P.M. 5.40 A.M. 12.01 A.M.

5. Write as in example 4:

20 min. past 5, forenoon 10 min. to 6, afternoon
16 min. past 10, forenoon 15 min. to 9, afternoon

6. Write the time that your school begins in the forenoon; in the afternoon.

7. Find out at what time the sun will rise to-morrow; at what time it will set.

The Calendar

51. Exercise:

To the Teacher. Teach pupils how to use the calendar of the current year.

1. How many days are there in a week? Name them. How many days are there in 2 weeks?

2. Which is the first day of the week? the second? the fourth? the seventh? the third? the sixth? the fifth?

3. Name and count the months, and learn that:

12 months (mo.) = 1 year (yr.)

4. Learn from the calendar a short way of writing the names of the months.

5. Find on the calendar:

January first; July fourth; December twenty-fifth; May fifth; November eleventh; February twenty-second.

6. What other name is given to January first? to December twenty-fifth? to July fourth?

A short way to write the date January first, 1921, is *Jan. 1, 1921.*

7. Write the date of your birth; of Christmas this year; of Christmas last year; on which Washington was born; on which Lincoln was born.

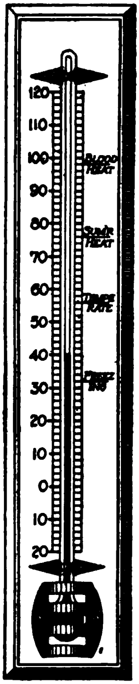
8. Write the names of the months and opposite each the number of days in it. Add the days of all the months of the year; how many are there?

A full date may be written, *Saturday, Feb. 7, 1921.*

9. Write the full date of last New Year; next New Year; last fourth of July. (See calendars.)

52. Weather Conditions for March 12 in a Certain Year

Hour	Temperature	Weather	Wind
6 A.M.	31°	Rain	S. E.
8 A.M.	33°	Partly cloudy	S. E.
Noon	36°	Foggy	S.
4 P.M.	42°	Cloudy	S. W.
6 P.M.	46°	Clear	W.



The sign ° stands for **degree** or **degrees.**

S. E. stands for *southeast* and *S. W.* for *southwest.*

53. Exercise:

1. Tell what **temperature** this thermometer shows; at what temperature water freezes.

2. How warm should your home be kept in winter? your schoolroom?

3. Find 32° on this thermometer.

4. What is the temperature of this room?

5. Read from the table, section 52, the weather conditions for each hour given for March 12.

6. Rule a weather chart as in section 52, and write in it every day for a week what you observe about the temperature, weather, and wind.

To the Teacher. The pupil should be encouraged to make such observations as are necessary to fill in the facts as given in the table, section 52; the accuracy of his observations should be tested. Have him experiment with a real thermometer. Teach the meaning of "below zero."

Multiplying by 4 and by 5

54. You have already built these tables and studied them (see pages 55 and 58). Learn them now so well that you can repeat them without making a mistake.

55. **Tables**

$4 \times 1 = 4$
$4 \times 2 = 8$
$4 \times 3 = 12$
$4 \times 4 = 16$
$4 \times 5 = 20$
$4 \times 6 = 24$
$4 \times 7 = 28$
$4 \times 8 = 32$
$4 \times 9 = 36$
$4 \times 10 = 40$

$5 \times 1 = 5$
$5 \times 2 = 10$
$5 \times 3 = 15$
$5 \times 4 = 20$
$5 \times 5 = 25$
$5 \times 6 = 30$
$5 \times 7 = 35$
$5 \times 8 = 40$
$5 \times 9 = 45$
$5 \times 10 = 50$

56. Exercise:

1. How many are:

four 1's? five 2's? four 3's? five 4's? four 5's?
five 6's? four 7's? five 8's? four 9's? five 10's?
four 2's? five 1's? four 4's? five 3's? four 6's?
five 5's? four 8's? five 7's? four 10's? five 9's?

2. How many are:

4×2? 2×4? 4×3? 3×4? 4×5? 5×4?
5×2? 2×5? 5×3? 3×5? 5×4? 4×5?

3. Count by 4's to 40; then write and learn: $1 \times 4 = 4$; $2 \times 4 = 8$; $3 \times 4 = 12$; and so on to $10 \times 4 = 40$.

4. Count by 5's to 50; then write and learn: $1 \times 5 = 5$; $2 \times 5 = 10$; $3 \times 5 = 15$; and so on to $10 \times 5 = 50$.

57. Exercise:

1. How much postage was paid on a package on which there were:

a. 4 two-cent stamps? *b.* 4 five-cent stamps?
c. 5 six-cent stamps? *d.* 4 eight-cent stamps?

2. How many persons are 5 couples?

3. How many days are there in 4 weeks? 5 weeks?

4. Four nickels are worth how many cents? 4 dimes are worth how many cents?

5. I must pay how many cents for five 5-cent car fares? for five 6-cent fares?

6. Five dimes are worth how many 1-cent pieces?

7. Four pairs of mules are how many mules?

8. Four rows of cherry trees, 8 in a row, are how many cherry trees? How many if 9 are in a row?

9. A passenger car has 8 wheels; five passenger cars have how many wheels?

10. Four automobiles contain how many persons if there are 6 persons in each? if there are 8 persons in each?

11. Vera rides to and from school each day, paying 4¢ car fare each way. How much car fare does she pay for these rides for a school week?

12. John said that if he saves 6¢ a day for four days he will have nearly enough to buy a thrift stamp; how much more will he need?

13. Earl paid 10 cents for a scout book and 5 times as much for a scout belt; how much did he pay for both?

58. Exercise — Review:

Copy, supplying the missing numbers:

1. 4 × 1 = —
2. 4 × — = 12
3. 4 × 6 = —
4. 4 × — = 32
5. 5 × — = 20
6. 4 × 4 = —
7. 5 × — = 35
8. 5 × 7 = —
9. — × 2 = 10
10. 5 × 3 = —
11. 4 × — = 4
12. — × 9 = 36
13. — × 8 = 40
14. 4 × — = 28
15. — × 7 = 35
16. 4 × 8 = —
17. 5 × — = 40
18. 5 × 1 = —
19. 5 × — = 15
20. — × 5 = 25
21. 4 × 2 = —
22. — × 6 = 24
23. 4 × 5 = —
24. — × 1 = 5
25. — × 7 = 28
26. 5 × — = 30
27. 4 × — = 20
28. — × 6 = 30
29. 5 × 9 = —
30. — × 3 = 15
31. 4 × 3 = —
32. 5 × — = 10
33. — × 1 = 4
34. 5 × — = 5
35. 5 × 8 = —
36. — × 3 = 12
37. 4 × — = 8
38. — × 4 = 16
39. 5 × 4 = —
40. 5 × 5 = —
41. — × 2 = 8
42. 5 × — = 25
43. — × 5 = 20
44. 4 × 7 = —
45. 4 × — = 36
46. 4 × 9 = —
47. — × 9 = 45
48. 5 × — = 45
49. 5 × 6 = —
50. 4 × — = 16
51. — × 4 = 20
52. 4 × — = 24
53. 5 × 2 = —
54. — × 8 = 32
55. 4 × 10 = —
56. — × 10 = 50
57. 5 × 10 = —
58. — × 10 = 40
59. 4 × — = 40
60. 5 × — = 50

To the Teacher. Such exercises as those in section 58 should be used, from time to time, as oral reviews, even after pupils have advanced considerably beyond this point.

Multiplying Numbers of Two Figures and Three Figures by 2, 3, 4, and 5

59. Multiply 358 by 4.

$$\begin{array}{r}358\\ \underline{4}\\ 1432\end{array}$$

4 × 8 units = 32 units, or 3 tens and 2 units; write 2 in units' place.

4 × 5 tens = 20 tens, to which 3 tens are added, making 23 tens, or 2 hundreds and 3 tens; write 3 in tens' place.

4 × 3 hundreds = 12 hundreds, to which 2 hundreds are added, making 14 hundreds, or 1 thousand and 4 hundreds; write 4 in hundreds' place and 1 in thousands' place.

The answer is *1432*

In practice think: 32 (write 2); 20, 23 (write 3); 12, 14 (write 14).

60. Exercise:

Copy, multiply, and check (see section 40, page 95):

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	25 2	38 2	46 2	57 2	69 2	14 3	25 3	$36 3
2.	48 3	57 3	15 4	24 4	35 4	44 4	96 4	$17 4
3.	25 5	62 5	78 5	99 5	409 2	418 2	470 2	$367 2
4.	396 2	215 3	207 3	280 3	295 3	199 3	219 4	$208 4
5.	205 4	345 4	697 4	109 5	108 5	248 5	397 5	$499 5

Multiply, using as multipliers, 4 in example 1, 5 in example 2, 4 in example 3, 5 in example 4, and 3 in example 5.

61. Exercise:

1. How many pails are there in 4 bundles, if each bundle contains 52 pails?

$$\begin{array}{l} 52 \text{ is the number of pails in 1 bundle.} \\ \underline{4} \\ ? \text{ is the number of pails in 4 bundles.} \end{array}$$

2. How many are there in 4 dozen? 3 dozen? 2 dozen?

3. How many oranges are there in 3 boxes, each containing 36 oranges? in 2 boxes? in 4 boxes?

4. A bushel of oats weighs 32 pounds; find the weight of 3 bushels of oats; of 2 bu.; of 4 bu.

$$\begin{array}{l} 32 \text{ pounds is the weight of 1 bushel of oats.} \\ \underline{3} \\ ? \text{ pounds is the weight of 3 bushels of oats.} \end{array}$$

5. James set out 4 rows of celery plants, 25 plants to the row; how many celery plants did he set out?

6. Five girls sold 25 tickets each for a Christmas play. How many did they all sell?

7. What is the cost of a thrift stamp? of 2 thrift stamps? of 4 thrift stamps? of 5 thrift stamps?

8. I rode 4 hours in a train which ran 40 miles each hour; how far did I ride in the 4 hours?

9. In a two-pound box of loaf sugar Emily counted 200 small pieces; how many pieces are there in 4 such boxes? in 2 boxes? in 5 boxes?

10. On a thrift card there are spaces for 16 thrift stamps. How many thrift stamps are required to fill all the spaces on 5 thrift cards?

Dividing by 4 and by 5

62. Exercise (Review pages 57 and 59):

1. What is $\frac{1}{4}$ of: 4? 8? 12? 16? 20? 24? 28? 32? 36? 40?

2. What is $\frac{1}{5}$ of: 5? 10? 15? 20? 25? 30? 35? 40? 45? 50?

Copy, and write the proper number after =:

3. 4 ÷ 4 = 4. 16 ÷ 4 = 5. 10 ÷ 5 = 6. 20 ÷ 5 =
7. 24 ÷ 4 = 8. 30 ÷ 5 = 9. 45 ÷ 5 = 10. 36 ÷ 4 =
11. 40 ÷ 4 = 12. 25 ÷ 5 = 13. 28 ÷ 4 = 14. 35 ÷ 5 =
15. 8 ÷ 4 = 16. 5 ÷ 5 = 17. 12 ÷ 4 = 18. 40 ÷ 5 =
19. 32 ÷ 4 = 20. 50 ÷ 5 = 21. 20 ÷ 4 = 22. 15 ÷ 5 =

23. Read examples 3–22, naming at sight the answers.

Say the right number where each line is, reading from left to right, then down the columns:

	a	*b*	*c*	*d*
24.	16 = — 4's	50 = — 5's	12 = — 4's	20 = — 4's
25.	24 = — 4's	35 = — 5's	15 = — 5's	25 = — 5's
26.	32 = — 4's	40 = — 5's	20 = — 5's	45 = — 5's
27.	40 = — 4's	30 = — 5's	28 = — 4's	36 = — 4's

Copy, divide, and check:

28. 4)44 29. 4)48 30. 5)55 31. 4)84 32. 4)88
33. 4)444 34. 4)484 35. 4)844 36. 4)880 37. 4)404
38. 5)555 39. 5)505 40. 5)550 41. 4)800 42. 4)808

43. 45 cents will pay for how many 5-cent car fares?

44. How many gallons are there in 36 quarts?

63. Exercise:

1. How many 5-cent boxes of matches can be bought for 20 cents? for 30 cents? for 40 cents?

2. 28 boys are marching in 4 equal groups; how many are there in a group?

3. A quarter dollar is worth how many nickels?

4. 12 buttons on a card, 4 buttons to a row, are how many rows?

20 is called a score

5. How many 5's are there in a score? how many 4's? how many 10's? how many 2's?

6. A gardener put up 30 onions in 5 bunches, the same number of onions in each bunch; how many did he put in each bunch?

7. Robert has 50 cents in nickels; how many nickels has he? They are worth how many dimes?

8. Some girls used 36 inches of ribbon to make school badges; they used 4 inches of ribbon to make each badge. How many badges did they make?

9. Julia paid 20 cents for 5 packages of Santa Claus snow; how much was that a package?

10. Tell at sight how many nickels are worth: 30 pennies; 45 pennies; 25 pennies; 40 pennies; 35 pennies.

11. Name something that you can buy for 5 cents, and tell the class how many of these articles you can buy for 30 cents.

Division with Remainders

64. 9 may be put in *2 groups* of *4 each*, and **1 over (remainder 1)**; thus: |||| |||| | An easier way of saying this is:

$9 \div 2 = 4$, remainder 1.

65. 9 may be put in groups of 2 each, making 4 groups and 1 over; thus: || || || || | An easier way of saying this is:

$9 \div 2 = 4$, remainder 1.

66. *9 ÷ 2 = 4, remainder 1,* may be written

2)9
4, remainder 1. *Check:* $2 \times 4 + 1 = 9$.

67. Exercise:

Write the quotients and remainders, and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
1.	2)3	2)5	2)7	2)9	2)11	2)13	2)15	2)17	2)19
2.	3)4	3)5	3)7	3)8	3)10	3)11	3)13	3)14	3)16
3.	3)17	3)19	3)20	3)22	3)23	3)25	3)26	3)28	3)29
4.	4)5	4)6	4)7	4)9	4)10	4)11	4)13	4)14	4)15
5.	4)17	4)18	4)19	4)21	4)22	4)23	4)25	4)26	4)27
6.	4)29	4)30	4)31	4)33	4)34	4)35	4)37	4)38	4)39
7.	5)6	5)7	5)8	5)9	5)11	5)12	5)13	5)14	5)16
8.	5)17	5)18	5)19	5)21	5)22	5)23	5)24	5)26	5)27
9.	5)28	5)29	5)31	5)32	5)33	5)34	5)36	5)37	5)38
10.	5)39	5)41	5)42	5)43	5)44	5)46	5)47	5)48	5)49

Name at sight the quotients and remainders in exercise 67, reading from left to right, then down the columns.

To the Teacher. Return to exercise 67 frequently for drill.

Dividing Numbers of Two or Three Figures by 2, 3, 4, and 5

68. Divide 956 by 4.

$$\begin{array}{r} 4\overline{)956} \\ 239 \end{array}$$

9 hundreds ÷ 4 = 2 hundreds and 1 hundred, or 10 tens, over.
10 tens + 5 tens = 15 tens.
15 tens ÷ 4 = 3 tens and 3 tens, or 30 units, over.
30 units + 6 units = 36 units.
36 units ÷ 4 = 9 units.

The answer is 239.

Check:

$$\begin{array}{r} 239 \\ \underline{4} \\ 956 \end{array}$$

In practice think: 9 ÷ 4, (write 2); 15 ÷ 4, (write 3); 36 ÷ 4, (write 9).

69. Exercise:

Copy, divide, and check:

	a	*b*	*c*	*d*	*e*	*f*
1.	2)30	2)34	2)50	2)72	2)78	2)$ 94
2.	2)36	2)52	2)70	2)76	2)92	2)$ 98
3.	2)56	3)54	3)72	3)75	3)81	3)$ 87
4.	3)45	4)60	4)76	4)92	4)56	4)$ 64
5.	4)72	4)96	4)52	4)68	5)80	5)$ 65
6.	5)70	5)95	5)85	5)90	5)60	5)$ 75
7.	2)234	2)456	2)276	2)858	2)692	2)$ 818
8.	2)156	2)176	2)512	2)738	2)976	2)$ 998
9.	3)375	3)615	3)642	3)654	3)972	3)$ 981
10.	3)171	3)252	3)285	3)414	3)774	3)$ 828
11.	4)128	4)232	4)376	4)512	4)752	4)$ 976
12.	5)175	5)295	5)375	5)435	5)625	5)$ 895

70. Exercise:

1. Dorothy paid 44 cents for 4 pounds of sugar; how much was that a pound?

44 cents was the cost of 4 pounds.
4)44 cents
? cents was the cost of 1 pound.

2. How much was paid a week to a workman who received $75 for 5 weeks' work?

3. A piece of carpet measuring 72 yards was cut into 4 strips of equal length; find the length of each strip.

4. 56 chairs are to be arranged in 4 rows with the same number in each row; how many must be put in a row?

56 is the number to be put in 4 rows.
4)56
? is the number that must be put in a row.

5. 72 handkerchiefs were put up in 3 boxes, the same number in each box; how many were put into each box? If put up in 4 boxes, how many handkerchiefs in each?

6. 5 bushels of feed weighed 225 pounds; what did each bushel weigh?

7. A man bought 144 colored crayons in boxes containing four pieces each; how many boxes did he buy?

8. How many 2-cent stamps can be bought for 60 cents?

9. How many 5-cent pieces will make 75 cents?

10. How many 3-bushel bags are needed to hold 168 bushels of grain? to hold 336 bushels?

11. 248 quarts of sirup were put up in 4-quart cans; how many cans were required?

71. Exercise:

1. Count *1*, *4*, *7*, and so on by 3's to 31. Count by 3's from 31 to 1.

2. Count by 3's from 2 to 32; from 32 to 2.

3. Count *1*, *5*, *9*, and so on by 4's to 41. Count by 4's from 41 to 1.

4. Count by 4's from 2 to 42; from 42 to 2.

5. Count by 4's from 3 to 43; from 43 to 3.

6. Count by 5's from 1 to 51; from 2 to 52; from 3 to 53; from 4 to 54.

7. Count by 5's from 51 to 1; from 52 to 2; from 53 to 3; from 54 to 4.

Add at sight; subtract at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
8.	42	36	42	58	59	79	83	94
	10	20	30	30	40	20	50	40
9.	300	500	620	405	530	432	800	870
	200	200	400	300	430	232	200	230

Name the answers at sight, reading from left to right, then down the columns:

	a	*b*	*c*	*d*	*e*	*f*
10.	2 × 6	14 ÷ 2	4 × 5	27 ÷ 3	3 × 5	20 ÷ 5
11.	28 ÷ 4	4 × 6	40 ÷ 4	3 × 8	45 ÷ 5	2 × 9
12.	3 × 10	32 ÷ 4	5 × 8	30 ÷ 5	2 × 10	21 ÷ 3
13.	18 ÷ 3	2 × 8	50 ÷ 5	4 × 9	15 ÷ 5	5 × 7
14.	2)11	2)15	2)19	3)20	3)25	3)28
15.	4)15	4)25	4)30	5)12	5)24	5)33

72. Exercise :

Add and check :

1.	2.	3.	4.	5.	7.	8.
7	8	9	8	$1.10	$7.42	2756
5	5	7	9	.90	.28	3896
6	7	2	7	.42	.90	3959
3	6	6	6		.65	
2	3	8	8	6.	.78	9.
1	2	4	7	$2.48	.36	4978
7	5	7	6	1.78	.48	2567
8	7	9	9	.96	1.50	1978

Subtract ; check all answers :

10.	11.	12.	13.	14.	15.	16.	17.
930	758	861	540	626	909	543	407
680	272	488	281	485	421	465	259

18. Multiply each by 2 ; by 3 ; by 4 ; by 5 ; check :

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
456	590	109	563	306	856	528	797
386	859	879	476	540	790	356	679
278	397	760	880	786	995	909	987

19. Divide each by 2 ; by 3 ; by 4 ; by 5 ; check :

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
120	300	480	660	780	720	840	900
872	675	712	530	696	845	912	715
513	452	306	716	242	705	200	510
725	740	505	684	375	666	765	888
933	913	822	936	848	789	999	981

73. Exercise :

1. Multiply and learn :

11	11	11	11	12	12	12	12
2	3	4	5	2	3	4	5

2. How many eggs are there in 2 dozen? 3 dozen? 4 dozen? 5 dozen? $\frac{1}{2}$ dozen? $\frac{1}{4}$ dozen?

3. Frances put into her savings bank 6 pennies, 2 nickels, 2 dimes, and a quarter; how much money did she put into her bank?

4. Trolley cars leave Eleanor's home town every half hour from 6 A.M. to 10 P.M. They leave on the *hour* and *half hour*. At what times after 9 A.M. and before 3 P.M. can she leave home by trolley?

5. At 4 o'clock Henry and Samuel were told to help their mother for an hour and a quarter, after which they could play till 6 o'clock; how long could they play?

6. How many hours are there between 8 A.M. and noon? noon and 4 P.M.? 8 A.M. and 1 P.M.? midnight and noon? 9.30 A.M. and 12.30 P.M.? 1.30 P.M. and 4 P.M.?

7. Hugh and May are saving this year to buy and to decorate their own Christmas tree; they have $4.25. How much more do they need if they wish to buy:

A Christmas tree for $1.25,
5 yards of silver colored tinsel at 8¢ a yard,
4 bells at 10¢ each,
Electric lights at $2.50,
6 colored ornaments at 5¢ each?

74. Exercise:

1. George earned 25 cents on Monday and 15 cents more on Tuesday than on Monday; how much did he earn on Tuesday? How much both days?

2. Here is a page from Esther's account book. How much did she receive during February? How much did she pay out? How much had she remaining?

CASH ACCOUNT — FEBRUARY

Date		Received	Paid
1	On hand	65	
2	Hair ribbon		35
6	Allowance for home help	70	
6	Thrift stamp		25
12	Game for Lincoln's Birthday party		20
13	Valentines and stamps		24
13	Allowance	70	
13	Thrift stamp		25
15	Junior Red Cross		25
18	Candy		10
20	Allowance	70	
20	Thrift stamp		25
22	Washington's Birthday candy cherries		15
24	Colored crayons		25
27	Allowance	70	
27	Thrift stamp		25
	Balance		

To the Teacher. Pupils should be encouraged to keep neat monthly cash accounts and hand them to you at the end of each month.

75. Exercise:

1. How old is a man whose age is 4 score and 10 years?

2. The following table shows how much money the children in the primary grades of a certain school deposited in their school savings bank during one month and how much they withdrew that month.

Grade	Deposits	Withdrawals	Balance
First	$2.76	$0.25	
Second	3.98	.36	
Third	4.75	.78	
Fourth	5.12	1.04	
Total			

Find the balance each grade had on deposit at the end of the month, the total deposits, the total withdrawals, and the total balance for the month.

3. Here are statements showing how many newspapers a certain newsboy received each day for 2 weeks, and how many he had remaining unsold. Find the number he sold each day and fill in totals.

First Week

Day	Received	Unsold	Sold
Mon.	80	7	
Tues.	80	0	
Wed.	100	11	
Thurs.	95	6	
Fri.	95	18	
Sat.	150	12	
Total			

Second Week

Day	Received	Unsold	Sold
Mon.	80	0	
Tues.	90	6	
Wed.	100	12	
Thurs.	100	15	
Fri.	90	7	
Sat.	150	9	
Total			

4. How many more did he receive the second week than the first? How many more did he sell?

(Review pages 60 and 61.)

76. Name five articles that are sold by liquid measures, and the prices at which they are sold.

77. Learn this:

Table

2 pints (pt.) = 1 quart (qt.)
4 quarts (qt.) = 1 gallon (gal.)

78. Exercise:

1. How many pints are there in:

2 qt.? 3 qt.? 4 qt.? 5 qt.? $\frac{1}{2}$ qt.? $1\frac{1}{2}$ qt.?

2. How many quarts are there in:

2 gal.? 3 gal.? 4 gal.? 5 gal.? $\frac{1}{2}$ gal.? $\frac{1}{4}$ gal.?

3. A 16-quart can will hold how many gallons?

4. 10 pint bottles will hold how many quarts of milk?

5. A gallon of cream will fill how many pint bottles?

6. Have you ever bought a pint or a quart of anything? What was it? What did you pay for it?

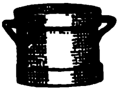
7. Grace's mother buys 2 quarts of milk a day; how much does it cost her at 14¢ a quart? What is the price of a quart of milk where you live?

8. Find the cost of 3 gallons of gasoline at 28¢ a gallon. What do 3 gallons of gasoline cost where you live?

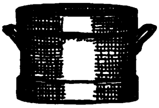
To the Teacher. See "To the Teacher," page 62. If pails, watering cans, or other receptacles are available, have the pupils estimate the capacity of each and test the estimate by measuring the quantity of water it holds.

(Review pages 62 and 63.)

79. Make a list of five kinds of grain, five kinds of fruit, and five kinds of vegetables that are sold by these measures. State prices if you can.



1 pint



1 quart

1 peck

½ bushel

80. Learn this:

Table

2 pints (pt.) = 1 quart (qt.)
8 quarts (qt.) = 1 peck (pk.)
4 pecks (pk.) = 1 bushel (bu.)

81. Exercise:

1. How many pints are there in:

2 qt.? 3 qt.? 4 qt.? 5 qt.? ½ qt.? 2½ qt.?

2. How many quarts are there in:

2 pk.? 3 pk.? 4 pk.? 5 pk.? ½ pk.? ¼ pk.?

3. How many pecks are there in:

2 bu.? 3 bu.? 4 bu.? 5 bu.? ½ bu.? ¼ bu.?

4. How many bushels are there in:

16 pk.? 8 pk.? 12 pk.? 20 pk.?

82. Exercise.

1. Fred sold 16 pint boxes of berries; how many quart boxes would these fill? Did he sell more or less than a peck or just a peck?

2. How many pint boxes are needed to hold 4 quarts of cherries? 5 quarts? 10 quarts?

3. Father bought a peck of seed and sowed all of it but 1 quart; how many quarts did he sow?

4. Have you ever sold a pint, a quart, or a peck of anything? Tell the class about it. How much money did you receive?

5. 2 qt. of peas were sold at 8¢ a pint; what was received for them?

6. Find the cost of $\frac{1}{2}$ pk. of potatoes at 50¢ a peck; of a bushel; of 3 bushels.

7. When turnips are selling at 10¢ a peck, how much is that a bushel? How much a half bushel?

8. 2 qt. of pop corn were put up in pint packages and sold at 10¢ a package; how much was received for them? How many pint packages would a peck of pop corn make?

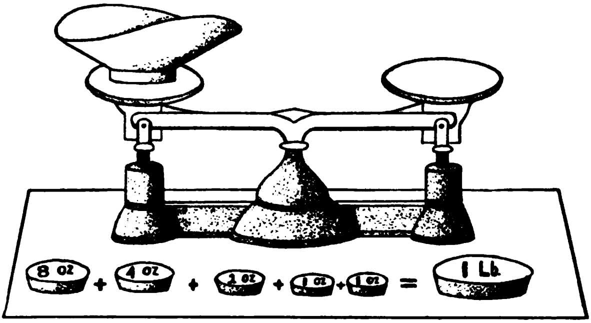
9. How many pecks of seed will a 2-bushel bag hold? a 3-bushel bag? a 4-bushel box?

10. Have you ever bought a pint, a quart, or a peck of anything? What was it? How much did you pay for it?

11. What must you pay for a peck of apples where you live? for a peck of potatoes?

12. A bushel of potatoes weighs 60 pounds. What does a peck of potatoes weigh?

83. Make a list of five articles sold by these weights; give the price at which the articles on your list are sold.



16 ounces (oz.) = 1 pound (lb.)

84. Exercise:

Some Market Prices (Subject to change)

Coffee, per lb.	**42¢**	**Hams, per lb. . . .**	**40¢**
Cheese, per lb.	**37¢**	**Lard, per lb. . . .**	**32¢**
Granulated sugar, per lb.	**14¢**	**Butter, per lb. . . .**	**60¢**

From the price list above find the cost of these orders:

1. Coffee, 1 lb.
Granulated sugar, 3 lb.
Lard, 2 lb.

2. Ham, 2 lb.
Cheese, 1 lb.
Butter, 1 lb.

3. Coffee, 1 lb.
Granulated sugar, 2 lb.
Butter, 1 lb.
Cheese, 1 lb.

4. Coffee, 2 lb.
Granulated sugar, 4 lb.
Butter, 1 lb.
Lard, 1 lb.

To the Teacher. Have the pupils make up and find the cost of similar small orders at current prices. Estimates of the weights of convenient objects, as letters, packages, books, and so on, should be made by the pupils, and their estimates tested.

85. 1. Count the inches on a foot rule.

2. Measure a yardstick with a foot rule.

86. Learn this:

Table

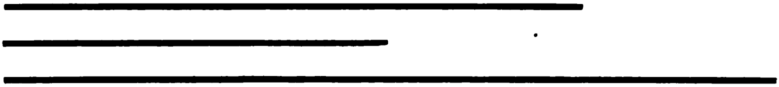
12 inches (in.) = 1 foot (ft.)
3 feet (ft.) = 1 yard (yd.)

87. Exercise:

1. How many inches are there in 2 feet? in 4 feet?

2. Many 2-foot rules are made to fold on hinges into 4 equal parts; how many inches are there in 1 part?

3. Look at these lines and tell how long you think each is; then measure each.



4. Cut off what you think is a foot of string, then test by measuring.

5. Draw on the blackboard a line 2 feet long and measure off on it:

1 ft. 6 in.; 1 ft. 9 in.; 2 in.; 10 in.; 1 ft. 3 in.

6. Draw on the blackboard a line that you think is a yard long, lay it off in feet, and test your estimates.

7. Draw on the blackboard a line that you think is 2 feet long. Divide it as nearly as you can into two equal parts and then each part into two equal parts. How long should each part be? Test.

88. Exercise:

1. How many feet are there in 2 yd.? 4 yd.? 5 yd.?

2. How many inches are there in 2 ft.? 3 ft.? 4 ft.?

3. How many yards are there in 15 ft.? 18 ft.? 24 ft.?

4. Supply the missing numbers:

1 ft. 6 in. = — inches 1 ft. 9 in. = — inches
1 ft. 10 in. = — inches 2 ft. 3 in. = — inches

5. How long is this page of your book?

6. Look carefully at a foot rule divided into inches and tell how many inches there are in $\frac{1}{2}$ ft.; $\frac{1}{4}$ ft.; $\frac{1}{3}$ ft.

Estimate; then test with a rule or tape measure to the nearest inch:

7. How tall you are in feet and inches; in inches.

8. The length of your step in feet and inches.

9. The length of your schoolroom; the width.

10. The length of a brick; the width; the thickness.

TO THE TEACHER. Pupils should be given much practice in estimating lengths and distances. These estimates should always be tested.

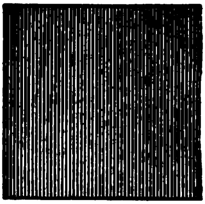
11. Place a mark on the blackboard; then place a second mark a foot to the right of the first, as nearly as you can judge; a third, a foot above the second; and a fourth, a foot below the first. Test.

12. Find out how far you live from the schoolhouse.

13. Bring to class a list of 4 articles that are sold by the yard and the price of a yard of each.

14. Tell the class how to find the cost of 2 yards, 3 yards, 4 yards, and 5 yards of one of the articles on your list.

89. Exercise:

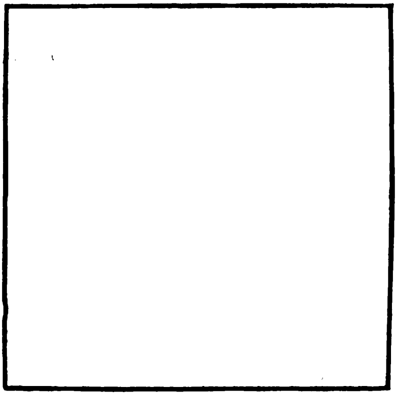


1. How many sides has this square?

2. Measure each side of this square with your rule; how long is each side?

A square each of whose sides is 1 inch long is a square inch (sq. in.).

3. Cut from paper a square 2 inches on a side; fold it into square inches and count the square inches.



4. Measure each side of this square; how long is each side?

5. How many square inches are there in a **2-inch square**?

6. Cut from paper a 3-inch square, fold it into square inches, and count the square inches.

7. How many rows of square inches are there in a 3-inch square? How many square inches are there in a row? How many square inches are there in a 3-inch square?

8. How many square inches are there in a 4-inch square? in a 5-inch square?

9. What is the distance around a 1-inch square? a 2-inch square? a 3-inch square? a 4-inch square?

90. Exercise:

1. Draw on the blackboard a square each of whose sides is 1 foot.

A square each of whose sides is 1 foot long is a square foot (sq. ft.).

2. Draw on the blackboard a square each of whose sides is 2 feet.

A square 2 feet on a side is a 2-foot square.

3. Separate by points each side of the 2-foot square into 2 equal parts and join the opposite points by straight lines.

4. How many rows of square feet are there in a 2-foot square? How many square feet are there in a row?

5. How many square feet are there in a 2-foot square?

A square 3 feet on a side is a 3-foot square.

6. How many rows of square feet are there in a 3-foot square? How many square feet are there in a row?

7. How many square feet are there in a 3-foot square?

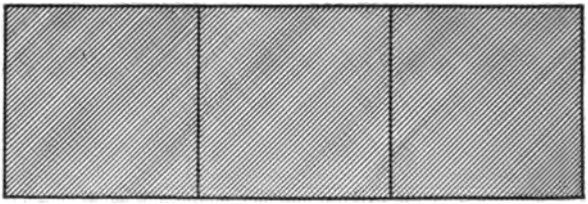
Each side of a 3-foot square is 1 yard long.

A square each of whose sides is 1 yard long is a square yard (sq. yd.).

8. Draw on the blackboard a square, each of whose sides is 1 yard, and divide it into square feet.

9. How many square feet are there in a square yard?

10. How many square feet are there in 2 square yards?

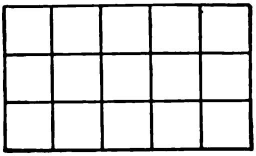


91. Exercise:

1. How long is this rectangle? How wide? How many square inches are there in it?

2. Draw a rectangle 3 in. long and 2 in. wide; divide it into square inches. How many square inches are there in one long row? How many long rows are there? How many square inches are there in the rectangle?

3. Cut from paper a rectangle 3 in. long and 2 in. wide. Fold it into square inches and tell how many square inches it contains.



Here is a rectangle divided into small squares.

4. How many long rows of squares has this rectangle? How many squares are there in a long row? How many squares are there in the rectangle?

5. If each of the squares in the rectangle were a square inch, how many square inches would there be in it? If each were a square foot, how many square feet? If each were a square yard, how many square yards?

6. How many square inches in the front cover of a book 6 in. long and 4 in. wide?

92. Exercise:

1. Cut from cardboard or stiff paper a rectangle 5 inches long and 4 inches wide with straight lines drawn on it dividing it into square inches. Bring it to class tomorrow and tell how you can find the number of square inches in it without counting them.

2. How many square inches are there in a flag 5 inches wide and 8 inches long? Is this a large flag?

3. How many square feet are there in a flag 2 feet wide and 3 feet long?

4. Ethel's pansy bed is 6 feet long and 4 feet wide. How many square feet does it contain?

5. If your blotter is 8 inches long and 4 inches wide, how many square inches are there in it? What is the distance around it?

6. How many square inches are there in a rectangle 3 in. long and 2 in. wide (3 in. by 2 in.)?

7. How many square inches are there in a rectangle:
4 in. by 2 in.? 5 in. by 2 in.? 5 in. by 3 in.?

8. How many square feet are there in a rectangle:
2 ft. by 1 ft.? 3 ft. by 2 ft.? 4 ft. by 2 ft.?

9. How many square yards are there in a rectangle:
3 yd. by 2 yd.? 4 yd. by 2 yd.? 4 yd. by 3 yd.?

10. Charles told his mother the right number of square yards of oilcloth needed to cover their kitchen floor, which is 5 yards long and 4 yards wide. What number did he tell her?

Review and Practice

93. Exercise:

Add and check:

	a	*b*	*c*	*d*	*e*	*f*
1.	923 317 114	587 824 212	826 934 306	754 267 405	689 866 510	364 192 174
2.	3598 4827 618	4683 2785 1867	6523 461 2487	2489 2754 4657	5469 3128 1284	1552 3436 1895
3.	2967 296 2765	4683 1598 2387	5813 2167 1456	6354 2145 1267	4892 3268 1133	2063 5947 1285
4.	2589 2167 3248 1179	3509 1446 3029 1347	3687 1568 2206 2487	5123 2069 1333 1282	1726 2834 1283 3287	4359 1672 2086 1475
5.	4682 792 2673 84	6003 1760 334 3	467 4589 6 108	56 4832 1523 469	3076 9 2875 82	6248 493 79 683

Find the missing numbers by adding upward and across:

6. 308 + 78 + 230 =
106 + 7 + 98 =
99 + 126 + 3 =
? + ? + ? = ?

7. 1024 + 276 + 325 =
106 + 72 + 78 =
48 + 9 + 3 =
? + ? + ? = ?

94. Subtract 2528 from 7000.

This shows the complete work. *In practice set down only this:*

$$\begin{aligned} 7000 &= 6000 + 900 + 90 + 10 \\ \underline{2528} &= \underline{2000} + \underline{500} + \underline{20} + \underline{\ \ 8} \\ \text{Difference} &= 4000 + 400 + 70 + \ \ 2 = 4472 \end{aligned}$$

Check: $4472 + 2528 = 7000$.

$$\begin{array}{r} 7000 \\ \underline{2528} \\ 4472 \end{array}$$

Remark. If method 2 of page 81 is employed in finding the above difference, it should be observed that the minuend must be increased by 10 units, 10 tens, and 10 hundredths in turn, and the subtrahend by 1 ten, 1 hundred, and 1 thousand in turn.

95. **Exercise:**

Copy, subtract, and check:

	a	*b*	*c*	*d*	*e*	*f*
1.	500	782	684	527	730	700
	328	394	297	368	546	469
2.	2945	8367	4927	5642	4000	5463
	1267	4798	2848	3753	1657	2785
3.	6801	9832	8000	5923	3921	6666
	4736	7257	5487	2365	1278	3799
4.	7024	5230	6401	7050	8203	7421
	5637	2315	2489	3762	4465	4582
5.	5000	9000	7000	6000	3000	6314
	2673	5291	4976	3392	1596	4567
6.	5000	8123	7035	6502	4258	7123
	2075	5434	4956	3783	2699	6505

7. Make up ten examples like the above, and subtract.

United States Money

96. Exercise:

1. Add: $14.89 + $23.64 + $9.36.

$14.89
23.64
9.36
$47.89

SUGGESTION. Be careful to write the decimal points in a column. Add as in ordinary numbers, and place the decimal point before the last two figures to separate dollars from cents.

Add:

2. $ 4.35	3. $ 8.58	4. $ 13.48	5. $ 24.06
6.53	7.36	15.09	34.35
7.25	0.76	32.62	7.83
14.62	28.96	34.16	16.00

6. $5.27 + $8.64 + $23.67 + $28.62.

7. $9.28 + $19 + $0.68 + $46.88.

8. $0.64 + $14.12 + $10.36 + $1.36 + $0.69.

Subtract:

9. $27 − $14.27; $35 − $25.09.

$27.00
14.27
$12.73

SUGGESTION. Be careful to write the decimal points in a column. Subtract as in ordinary numbers, and place the decimal point before the last two figures to separate dollars from cents.

10. $7.36	11. $25.41	12. $190.16	13. $206.55
3.87	12.75	95.50	195.71
14. $10.00	15. $42.35	16. $256.13	17. $465.32
.75	9.26	123.78	262.94

18. $ 34.10 − $ 19.46
19. $256.96 − $ 75.92
20. $975.25 − $209.75
21. $700 − $125.75
22. $250.50 − $ 75.75
23. $500 − $125.25

97. Exercise:

1. Mr. Day bought a lot for $ 750 and built on it a house that cost $ 3875; how much did both cost him?

2. James had $ 2.75 and earned $ 3.75 more; how much had he then?

3. I had a 1000-mile ticket, but have used 695 miles of it; how many miles of it have I yet to use?

4. Mr. Rowe's crop for a certain year was 268 bushels of wheat, 308 bushels of oats, 564 bushels of corn, and 78 bushels of rye; how much grain did he raise that year?

5. Frank and John together have $ 4.85. If Frank has $ 2.90, how much has John?

6. A wagon loaded with coal weighed 5268 pounds. If the wagon weighed 1825 pounds, what was the weight of the coal?

7. A farmer was paid $ 175.20 for his wheat and $ 106.30 for his potatoes; how much was he paid for both?

8. My brother earned $ 1.75 on Monday, $ 1.60 on Tuesday, $ 1.85 on Wednesday, $ 1.45 on Thursday, and $ 1.75 on Friday; how much did he earn in the 5 days?

9. Find the sum of one thousand four hundred eight, three thousand forty-eight, and six hundred seventy-six.

10. What amount of money must be added to $ 756.25 to make the sum $ 1000?

11. Name 4 pieces of money that are together worth 90¢; 41¢; 81¢; 66¢.

98. Exercise:

1. Find the sum of all the numbers that are greater than 1298 and less than 1304.

2. Find the sum of all the numbers that can be written each with the figures 6, 7, and 8.

3. A farmer sold 3 loads of corn. The wagon and corn were first weighed and afterwards the wagon; find the weight of the corn in each load and fill in the totals:

Loads	Gross Weight	Weight of Wagon	Weight of Corn
First	4678 lb.	1269 lb.	
Second	4509 lb.	1260 lb.	
Third	4328 lb.	1287 lb.	
Total			

Note. — Here gross weight means the weight of the wagon and the corn.

4. A boy kept his account for a week as here shown; did he add correctly in finding his receipts and expenses?

Boy's Account for Week Ending March 13, 1920

1920 March	*Receipts*		1920 March	*Expenses*	
7	On hand	$0.37	8	Tablet	$0.10
8	Allowance	.50	9	Top	.05
10	Waste paper	.12	10	Peanuts	.08
13	Delivering newspapers	.25	12	2 Thrift Stamps	.50
		$1.24	13	Balance on hand	.51
					$1.24

If you receive and spend any money next week, keep an account of it like the above and show it to your teacher.

Multiplying by 6

99. Exercise:

1. Build the table of 6's as you built the table of 4's. (See example 1, page 55.)

2. How many are:

six 1's? six 5's? six 2's? six 4's? six 3's?
six 8's? six 6's? six 10's? six 9's? six 7's?

3. Learn this table:

6 × 1 = 6 **6 × 6 = 36**
6 × 2 = 12 **6 × 7 = 42**
6 × 3 = 18 **6 × 8 = 48**
6 × 4 = 24 **6 × 9 = 54**
6 × 5 = 30 **6 × 10 = 60**

4. Read, supplying the missing numbers:

6 × ? = 12 6 × ? = 42
6 × ? = 48 6 × ? = 24
6 × ? = 30 ? × 7 = 42
6 × ? = 54 6 × ? = 18
6 × ? = 36 ? × 9 = 54

5. Count *6*, *12*, *18*, and so on to *60*.

6. Write and learn 1 × 6 = 6; 2 × 6 = 12; 3 × 6 = 18; and so on to 10 × 6 = 60.

7. How many are 6 × 2? 2 × 6? 6 × 3? 3 × 6? 6 × 4? 4 × 6? 6 × 5? 5 × 6? 6 × 0? 0 × 6?

8. Multiply at sight each of the following numbers by 6; by 2; by 3; by 4; by 5. How fast can you do this?

6 4 1 3 5 2 8 7 9

Copy and multiply by 6:

	a	*b*	*c*	*d*	*e*	*f*
9.	42	54	40	37	56	89
10.	567	835	489	739	678	589
11.	687	956	938	887	699	999
12.	477	808	660	980	883	987

Dividing by 6

100. Each of the six equal parts of a number is called **one sixth** ($\frac{1}{6}$) of it.

101. Exercise:

1. What is $\frac{1}{6}$ of: 12? 18? 24? 30? 36? 42? 48? 54? 60?

Divide and check:

2. 6)6 6)12 6)24 6)48 6)30 6)18 6)42 6)36 6)54

	a	*b*	*c*	*d*	*e*		*a*	*b*
3.	6)7	6)8	6)9	6)10	6)11	12.	6)60	6)66
4.	6)13	6)14	6)15	6)16	6)17	13.	6)72	6)84
5.	6)19	6)20	6)21	6)22	6)23	14	6)114	6)144
6.	6)25	6)26	6)27	6)28	6)29	15.	6)252	6)384
7.	6)31	6)32	6)33	6)34	6)35	16.	6)444	6)456
8.	6)37	6)38	6)39	6)40	6)41	17.	6)672	6)648
9.	6)43	6)44	6)45	6)46	6)47	18.	6)738	6)816
10.	6)49	6)50	6)51	6)52	6)53	19.	6)708	6)882
11.	6)55	6)56	6)57	6)58	6)59	20.	6)750	6)870

21. Reading down the columns in examples 3–11, name at sight as many correct quotients and remainders as you can. Review this page frequently.

To the Teacher. **Examples 2–11 present all possible divisions involving 6 as a divisor and giving rise to quotients from 1 to 9 inclusive.**

Multiplying by 7

102. Exercise:

1. Build the table of 7's as you built the table of 4's. (See example 1, page 55.)

2. How many are:
seven 1's? seven 3's? seven 5's? seven 2's? seven 6's?
seven 4's? seven 10's? seven 7's? seven 9's? seven 8's?

3. Learn this table:

7 × 1 = 7
7 × 2 = 14
7 × 3 = 21
7 × 4 = 28
7 × 5 = 35
7 × 6 = 42
7 × 7 = 49
7 × 8 = 56
7 × 9 = 63
7 × 10 = 70

4. Read, supplying the missing numbers:

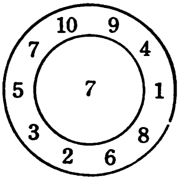
7 × ? = 21
7 × ? = 63
7 × ? = 28
? × 8 = 56
7 × ? = 56
? × 6 = 42
7 × ? = 42
7 × ? = 49
7 × ? = 35
? × 9 = 63

5. Count *7*, *14*, *21*, and so on to *70*.

6. Write and learn 1 × 7 = 7; 2 × 7 = 14; 3 × 7 = 21; and so on to 10 × 7 = 70.

7. How many are 7 × 2? 2 × 7? 7 × 3? 3 × 7? 7 × 4? 4 × 7? 7 × 5? 5 × 7? 7 × 6? 6 × 7? 7 × 0? 0 × 7?

8. Multiply each number in the ring by 7, giving the products at sight. Change the inner number to 6 and multiply.



Copy and multiply by 7:

	a	*b*	*c*	*d*	*e*	*f*
9.	21	34	56	62	78	89
10.	231	356	720	604	564	625
11.	378	739	843	709	893	808
12.	590	799	870	777	888	999

Dividing by 7

103. Each of the seven equal parts of a number is called **one seventh** ($\frac{1}{7}$) of it.

104. Exercise:

1. What is $\frac{1}{7}$ of: 7? 14? 21? 28? 35? 42? 56? 63? 70?

2. 28 ÷ 7 = ? 56 ÷ 7 = ? 42 ÷ 7 = ? 63 ÷ 7 = ?

3. Name at sight the missing numbers:

14 = —7's 35 = — 5's 56 = — 8's 42 = — 7's

4. Copy, divide, and check:

7)7 7)49 7)14 7)70 7)21
7)28 7)56 7)35 7)42 7)63

5. Here are some numbers of a list of 54, each greater than 7 and less than 70. When you divide any one of them by 7, there will be a remainder. Complete the list:

8 9 10 11 12 13
15 16 17 18 19 20

6. After completing the list in example 5, divide the numbers in it by 7, as in examples 3-11, page 136, writing the quotients and remainders. Check your answers. Review frequently.

Divide and check:

	a	*b*	*c*
7.	7)77	7)91	7)84
8.	7)105	7)119	7)147
9.	7)175	7)203	7)224
10.	7)245	7)266	7)301
11.	7)308	7)322	7)350
12.	7)392	7)406	7)476
13.	7)553	7)616	7)679
14.	7)714	7)847	7)896
15.	7)959	7)903	7)763
16.	7)910	7)917	7)756

105. Exercise:

1. How many days are there in 6 weeks? in 7 weeks?

2. How many quarts are there in 4 gallons? in 5 gallons? in 6 gallons? in 7 gallons?

3. How many pecks are there in 4 bushels? in 5 bushels? in 6 bushels? in 7 bushels?

4. How many quarts are there in 6 pecks? in 7 pecks?

5. Draw a rectangle 6 in. long and 2 in. wide; divide it into square inches and tell how many square inches it contains.

6. Alice and Mabel sold 8 quarts of lemonade by the glass; they sold how many glasses of lemonade if each quart made 4 glasses?

7. How many boxes must a boy have to hold 7 quarts of berries if he needs 2 boxes for each quart?

8. I go to bed at 9 P.M. and sleep until 7 A.M. How many hours do I sleep in a week?

9. If you buy 6 feet of rope at 3¢ a foot and pay for it with a quarter dollar, how much change should you receive?

10. Will bought 6 fishhooks at 7¢ each and paid for them with a 50-cent piece; how much change should he receive?

11. Which has in it the greater number of square inches and how many more, a square 6 inches long or a rectangle 7 inches long and 5 inches wide? Prove your answer by drawing the figures and dividing them into square inches.

106. Exercise:

1. For how many 6-cent car fares will 3 dimes pay?

2. How many days are there in $\frac{1}{7}$ of a week?

3. $\frac{1}{6}$ of a dozen = how many? $\frac{1}{6}$ of 2 dozen?

4. How many yards of carpet are there in a piece 21 ft. long? in a piece 30 ft. long?

5. 42 girls are marching in 6 equal rows; how many girls are there in a row?

6. How many weeks are there in 49 days?

7. 36 pieces of fruit are packed 6 pieces to a box; how many boxes are there?

8. Mr. Williams earns $42 during the 6 working days of a week; how much does he earn each working day?

9. A boy who earns $54 in 6 months earns how much each month, his earnings per month being the same?

10. 4 dimes and 2 pennies will pay for how many 7-cent spools of thread? how many 6-cent spools?

11. How many 6-cent pencils can I buy with a 25-cent piece and a nickel?

12. How many 7-cent oranges can you buy for 50 cents and how much change will you receive?

13. If you draw a rectangle containing 56 square inches arranged in 8 rows, how many square inches are there in each row? Prove your answer by drawing the figure.

14. How many weeks are there in November and how many days over? in December?

Multiplying by 8

107. Exercise:

1. Build the table of 8's.

2. How many are:

eight 1's? eight 3's? eight 5's? eight 2's? eight 4's?
eight 6's? eight 8's? eight 10's? eight 7's? eight 9's?

3. Learn this table:

8 × 1 = 8
8 × 2 = 16
8 × 3 = 24
8 × 4 = 32
8 × 5 = 40
8 × 6 = 48
8 × 7 = 56
8 × 8 = 64
8 × 9 = 72
8 × 10 = 80

4. Read, supplying the missing numbers:

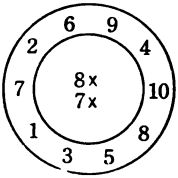
8 × ? = 24
8 × ? = 40
8 × ? = 16
8 × ? = 48
8 × ? = 72
? × 8 = 64
? × 5 = 40
8 × ? = 56
8 × ? = 32
8 × ? = 80

5. Count *8*, *16*, *24*, and so on to *80*.

6. Write and learn 1 × 8 = 8; 2 × 8 = 16; and so on to 10 × 8 = 80.

7. How many are 8 × 7? 7 × 8? 8 × 0? 0 × 8?

8. Multiply at sight each number in the ring by 8 and add to each product (*a*) 1; (*b*) 2; (*c*) 3; (*d*) 4; (*e*) 5; (*f*) 6. Multiply each number in the ring by 7 and add as before.



Copy, and multiply by 8:

	a	*b*	*c*	*d*	*e*	*f*	*g*
9.	11	13	12	23	54	76	89
10.	101	321	456	380	475	509	500
11.	675	746	768	870	785	900	889

12. Review all tables which you have had.

Dividing by 8

108. Each of the eight equal parts of a number is called **one eighth** ($\frac{1}{8}$) of it.

109. Exercise:

1. What is $\frac{1}{8}$ of: 8? 16? 24? 32? 40? 48? 56? 64? 72? 80?

2. Say the right number after =:

80 ÷ 8 =   56 ÷ 8 =   48 ÷ 8 =   72 ÷ 8 =

3. Name at sight the missing numbers:

16 = — 8's   40 = — 5's   56 = — 8's   72 = — 9's

4. Copy, divide, and check:

8)8   8)24   8)80   8)16   8)32

8)40   8)64   8)56   8)48   8)72

5. Here are some numbers of a list of 63, each greater than 8 and less than 80. When you divide any one of them by 8, there will be a remainder. Complete the list:

9 10 11 12 13 14 15
17 18 19 20 21 22 23

6. After completing the list in example 5, divide the numbers in it by 8, as in examples 3–11, page 136, writing the quotients and remainders. Check your answers. Review frequently.

Divide and check:

	a	*b*
7.	8)88	8)96
8.	8)128	8)144
9.	8)176	8)192
10.	8)224	8)272
11.	8)400	8)440
12.	8)504	8)528
13.	8)600	8)608
14.	8)704	8)720
15.	8)816	8)848
16.	8)912	8)952

Multiplying by 9

110. Exercise:

1. Build the table of 9's.

2. How many are:

9 × 1?   9 × 3?   9 × 5?   9 × 4?   9 × 2?
9 × 6?   9 × 10?   9 × 8?   9 × 7?   9 × 9?

3. Learn this table:

9 × 1 = 9
9 × 2 = 18
9 × 3 = 27
9 × 4 = 36
9 × 5 = 45
9 × 6 = 54
9 × 7 = 63
9 × 8 = 72
9 × 9 = 81
9 × 10 = 90

4. Read, supplying the missing numbers:

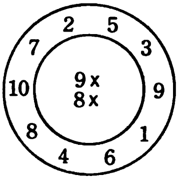
9 × ? = 18   ? × 4 = 36
? × 5 = 45   9 × ? = 27
9 × ? = 54   ? × 2 = 18
9 × ? = 90   9 × ? = 72
9 × ? = 63   9 × ? = 81

5. Count *9*, *18*, *27*, and so on to *90*.

6. Write and learn 1 × 9 = 9; 2 × 9 = 18; and so on to 10 × 9 = 90.

7. Multiply at sight each number in the ring by 9 and add to each product:

1; 2; 3; 4; 5; 6; 7; 8; 9.



8. Multiply at sight each number in the ring by 8 and subtract from each product:

1; 2; 3; 4; 5; 6; 7; 8.

Copy, and multiply by 9:

	a	*b*	*c*	*d*	*e*	*f*	*g*
9.	11	12	13	32	43	67	89
10.	123	245	346	530	607	879	987

11. Review all tables which you have had.

Dividing by 9

111. Each of the nine equal parts of a number is called **one ninth** ($\frac{1}{9}$) of it.

112. Exercise:

1. What is $\frac{1}{9}$ of: 9? 45? 27? 36? 18? 90? 81? 54? 72? 63?

2. Copy, divide, and check:

9)9 9)27 9)45 9)18 9)36

9)90 9)54 9)81 9)63 9)72

3. Here are some numbers of a list of 72, each greater than 9 and less than 90. When you divide any one of them by 9, there will be a remainder. Complete the list:

10 11 12 13 14 15 16 17
19 20 21 22 23 24 25 26

4. After completing the list in example 3, divide the numbers in it by 9, as in examples 3–11, page 136. Review frequently.

Divide and check:

	a	*b*
5.	9)99	9)108
6.	9)189	9)198
7.	9)252	9)279
8.	9)306	9)333
9.	9)396	9)405
10.	9)567	9)657
11.	9)684	9)693
12.	9)729	9)810
13.	9)918	9)936
14.	9)963	9)972

To the Teacher. There are 396 different examples possible in which the divisor is any number from 2 to 9 inclusive and the quotient a number of 1 figure. In 324 of these there are remainders. It is evident that the pupil's mastery of these 396 examples is a sure guarantee of his mastery of all work in short division, since no matter how many figures the dividend contains, if the divisor is any number from 2 to 9 inclusive, each step in the division must involve one of these 396 examples (except where zero occurs as a quotient figure). These 396 examples are all provided for on pp. 96–144.

113. Exercise:

1. How much will 8 two-cent stamps cost?

2. A ten-cent stamp and 9 two-cent stamps will cost how much?

3. How many feet are there in 8 yd.? in 9 yd.?

4. How many days are there in 9 weeks? in 8 weeks?

5. If Edmund earns 10¢ an hour, how much does he earn in 9 hr.? How much does he earn in 8 hr.?

6. 8 rows of squares, 10 in a row, are how many squares? Prove your answer by a drawing.

7. How many pints are there in 8 qt.? in 9 qt.?

8. 8 four-gallon cans hold how many gallons?

9. How many square inches are there in a rectangle 8 in. long and 2 in. wide? in one 9 in. long and 3 in. wide?

10. Find the cost of 9 lambs at $10 each.

11. It requires how many bushels of wheat to fill 9 two-bushel bags? to fill 9 three-bushel bags?

12. 8 pans of cakes, 6 to the pan, are how many cakes?

13. Ellen bought 8 yards of tape at 6 cents a yard and paid for it with a 50-cent piece; how much change should she receive?

14. Our flag has one star for each state. There are 6 rows of stars on our flag, 8 stars to the row; or 8 columns, 6 stars to the column; how many states have we?

15. Hugh has a home garden 8 yards long and 7 yards wide; how many square yards does it contain?

114. Exercise:

1. How many baseball teams of 9 boys each can be formed from 36 boys?

2. How many pecks are there in 32 qt.? in 40 qt.?

3. How many 8-foot logs can be cut from a log 24 feet long? from a log 40 feet long?

4. A grocer put 56 pounds of sugar into 8 sacks of the same size; how much did he put in each sack?

5. My brother and I bought 9 dozen tomato plants for 72 cents; how much was that a dozen?

6. Mrs. Gibson bought grapefruit at 8 cents each; she paid 72 cents for them; how many did she buy?

7. I wish to set out 64 plants in 8 rows; how many must I put in a row, if I put the same number in each?

8. At 8 cents a card, how many cards of buttons can Maud buy for 25 cents, and what change will she receive?

9. Mother gave me 50 cents to buy bells for my Christmas tree; how many can I buy at 6 cents each, and what change will I receive?

10. 8 girls plan to buy an 80-cent basket of fruit for a schoolmate who is ill. How much money must each give if they share the cost equally?

11. May joined a Christmas savings club. Her dues are 50 cents a week. Her father gives her 10 cents a week and she earns the rest of her dues by helping her mother each day after school; how much does she earn each day?

Review and Practice

115. Exercise:

Copy and multiply; then change each multiplier to 7 and multiply; to 8 and multiply; to 9 and multiply:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	27 6	39 6	58 6	64 6	69 6	90 6	67 6	89 6
2.	71 6	78 6	95 6	97 6	88 6	77 6	79 6	99 6
3.	130 6	102 6	207 6	300 6	375 6	458 6	397 6	378 6
4.	457 6	528 6	584 6	679 6	684 6	728 6	689 6	709 6
5.	777 6	768 6	798 6	789 6	958 6	947 6	968 6	979 6

6. Multiply $2.38 by 6.

$2.38
6
$14.28

Multiply as in ordinary numbers, and place the decimal point before the last two figures to separate dollars from cents.

Copy, and multiply each by 5; by 6; by 7; by 8; by 9.

	a	*b*	*c*	*d*	*e*
7.	$4.32	$0.76	$56.09	$29.17	$62.50
8.	$9.75	$94.18	$87.50	$92.25	$87.75
9.	$101.25	$275.75	$326.07	$420.45	$530.68

Review and Practice

116. Exercise:

Copy, divide, and check:

	a	*b*	*c*	*d*	*e*	*f*
1.	6)66	6)60	7)77	7)70	6)72	7)112
2.	8)88	6)84	6)90	6)96	6)78	7)224
3.	7)91	7)84	8)96	7)98	7)392	7)252
4.	6)102	9)108	8)104	6)366	6)456	7)539
5.	6)672	6)804	6)954	6)750	6)816	7)602
6.	7)147	7)791	7)812	7)903	8)344	8)608
7.	7)819	8)248	8)896	8)624	8)768	9)216
8.	8)920	8)704	9)819	9)765	9)495	9)567
9.	9)648	9)531	9)396	9)612	9)774	9)891

10. Divide $18.75 by 5.

5)$18.75 Divide and place the decimal point before the last
$ 3.75 two figures to separate dollars from cents. *Check.*

Divide and check:

	a	*b*	*c*	*d*
11.	2)$18.72	7)$35.14	5)$178.50	5)$176.25
12.	3)$31.05	9)$193.05	4)$374.24	5)$296.75
13.	6)$15.48	5)$100.10	5)$127.00	6)$475.80
14.	8)$33.60	6)$127.08	9)$38.07	9)$814.50

117. Exercise:

Copy, and fill in the missing amounts in the following:

1. The cost of:

6 plum trees at $1.25 each =
8 peach trees at $0.80 each =
7 pear trees at $1.10 each = ____
Total . . . . . . = $

2. Find the cost of 6 yards of cloth at 15 cents a yard.

3. A car that makes 24 trips a day makes how many trips a week? how many trips in 2 weeks?

4. How many hours are there in a week?

5. A gardener planted 8 rows of trees; if he planted 16 trees in each row, how many trees did he plant in all?

6. A farmer sold 8 loads of wheat; there were 25 bushels in each load; how many bushels did he sell?

7. A bushel of wheat weighs 60 pounds; find the weight of 8 bushels of wheat; of 9 bushels of wheat.

8. A bushel of corn weighs 56 pounds; find the weight of 6 bags of corn, each holding 3 bushels.

9. How many eggs will 9 crates hold, if each crate holds 6 dozen? How many will 8 crates hold?

10. How many persons can be seated in 8 rows of chairs, if there are 38 chairs in each row?

11. How many persons are seated in 6 cars, if there are 36 seats in each car with 2 persons on each seat?

12. Marion is saving to buy 8 thrift stamps. She has already saved $1.65: how much more does she need?

118. Exercise:

1. In 9 classrooms there are 405 desks, in each room the same number; how many are there in each room?

2. A dealer had 500 dressed chickens; he sold 68 of them and shipped the remainder in 6 barrels of equal size; how many did he put into each barrel?

3. Divide $ 648 among 3 persons, giving the first person $\frac{1}{6}$ of the money, the second $\frac{1}{9}$ of it, and the third the remainder.

4. Mr. Blanchard earned $ 84 in 4 weeks and his son George earned $ 66; how much did each earn in a week? How much did both earn in a week?

5. A farmer sold 2 calves, the first for $ 35 and the second for $ 43; what was the *average* selling price?

$ 35	was the selling price of the first.
$ 43	was the selling price of the second.
2)$ 78	was the selling price of both.
$?	was the *average* selling price.

6. A merchant bought 2 hams; the first weighed 23 pounds, the second 25 pounds. Find their average weight.

Find the cost of 1 pound of each if:

7. 6 lb. of coffee cost $2.10.
   8 lb. of bacon cost $ 2.
   5 lb. of ham cost $1.60.
   4 lb. of tea cost $ 2.80.

8. 7 lb. of butter cost $5.25.
   9 lb. of cheese cost $ 2.88.
   3 lb. of lard cost .90.
   8 lb. of prunes cost $ 2.40.

9. If you should buy groceries as listed in examples 7 and 8 at the prices which your grocer is now charging, what would be the total cost?

119. Read the letter on page 45. Here is another little letter from Uncle Sam; read it carefully:

UNCLE SAM'S
THRIFT STUDENTS

DEAR CHILDREN:

With the thrift stamp that you received for your filled Penny School Savings Book you will be given a card which has spaces for 16 thrift stamps. You can then fill another Penny Savings Book and exchange it for a thrift stamp, and so on until you have 16 thrift stamps pasted on your thrift card. For your filled thrift card and 12 to 23 cents more (according to the month) the teacher will give you a

War Savings Stamp.

Yours for thrift,
UNCLE SAM.

120. Exercise:

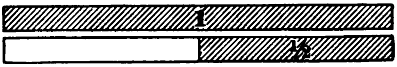
1. Find the cost of 2 thrift stamps; of 3; of 4; of 5.
2. When you have 16 thrift stamps pasted on your thrift card, how much is your thrift card worth?
3. Find out what a war savings stamp costs in January, and in each of the other months.
4. How much money did you earn last month? How much of it have you saved? Tell two good ways of spending money; tell of two poor ways.
5. What other things besides money should you save?

TO THE TEACHER. Principles of thrift should be taught daily not only with reference to earning and saving money; they should be associated as well with *care of health; careful use of clothing, books, time; neatness of person and dress; care of own property and that of others; efficient work, and so on.*

Results not Whole Numbers

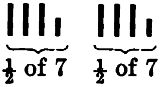
Dividing by 2

121. One of the two equal parts of one is **one half, ½.**



122. Here we see that:

(1) ½ of 7 = 3½.

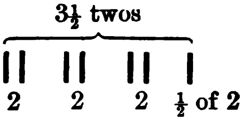


For, ½ of 7 is 3 and *1 over.*

½ of 1 is ½.

The answer is *three and one half,* written 3½.

(2) 3½ tells how many 2's there are in 7.



For, there are 3 *twos* in 7 and *1 over.*

This 1 is ½ of another 2.

Answer. There are 3½ *twos* in 7.

123. Finding ½ of 7 or how many 2's there are in 7 is called dividing 7 by 2. We call the answer 3½ the **quotient.**

124. Here is the short way to divide and check:

$$\begin{array}{r} 2\overline{)7} \\ 3\frac{1}{2} \end{array} \qquad \textit{Check: } 2 \times 3 + 1 = 7.$$

Notice where the 1 over is written in the quotient.

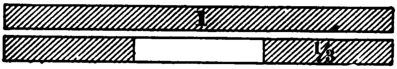
125. Exercise:

Divide, as in section 124, each of the following numbers by 2 and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	3	5	9	15	21	35	55	61
2.	7	11	19	23	27	51	87	93
3.	13	17	29	37	53	83	67	77

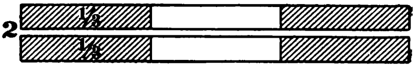
Dividing by 3

126. One of the three equal parts of one is **one third,** $\frac{1}{3}$.



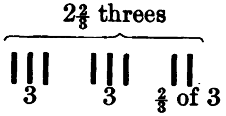
127. One third of two is *one third* and *one third,* or **two thirds,** $\frac{2}{3}$.

128. 1. Find $\frac{1}{3}$ of 8.



$\frac{1}{3}$ of 8 is 2 and 2 *over.*
$\frac{1}{3}$ of 2 is $\frac{2}{3}$.
The answer is *two and two thirds,* written $2\frac{2}{3}$.

2. How many 3's are there in 8?



There are 2 *threes* in 8 and 2 *over.*
Each one of the 2 over is $\frac{1}{3}$ of 3.
The 2 over are $\frac{2}{3}$ of 3.
The answer is $2\frac{2}{3}$.

129. Finding $\frac{1}{3}$ of 8 or how many 3's there are in 8 is dividing 8 by 3. When you divide 8 by 3, and check, you need write only this.

$$\begin{array}{r} 3\overline{)8} \\ 2\frac{2}{3} \end{array} \qquad \textit{Check: } 3 \times 2 + 2 = 8.$$

Notice where the 2 over is written in the quotient.

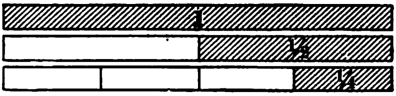
130. Exercise:

Divide, as in section 129, each of the following numbers by 3 and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	5	11	13	16	17	19	20	25
2.	7	31	35	62	73	80	82	91
3.	10	40	50	65	97	175	250	400

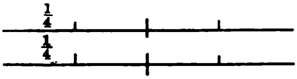
Dividing by 4

131. One of the four equal parts of one is **one fourth, $\frac{1}{4}$.**



132. Exercise:

1. What are two of the four equal parts of one called?
2. Name three of the four equal parts of one.
3. Read: $\frac{1}{4}$; $\frac{2}{4}$; $\frac{3}{4}$; $\frac{4}{4}$.
4. How many fourths do you see in $\frac{1}{2}$? $\frac{2}{4}=\frac{?}{2}$?
5. This shows that:
   $\frac{1}{4}$ of $2=\frac{1}{4}+\frac{1}{4}$, or $\frac{2}{4}$, or $\frac{1}{2}$.
6. Show that $\frac{1}{4}$ of $3=\frac{3}{4}$.



133. Finding $\frac{1}{4}$ of any number or how many 4's there are in a number is dividing the number by 4.

134. When you divide any number, as 14, by 4 and there is a remainder, you need write only the following:

$4\overline{)14}$ *Check:* $4 \times 3+2=14$.

$3\frac{2}{4}$, or $3\frac{1}{2}$ *Notice where the 2 over is written in the quotient.*

135. Exercise:

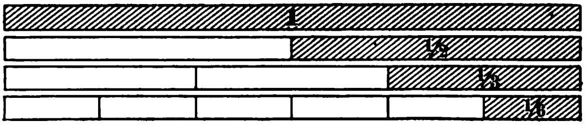
Divide by 4 and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	5	6	7	11	13	15	18	25
2.	9	10	17	30	45	65	50	75
3.	110	125	130	150	175	190	210	250

4. How many quarts of berries must a boy pick to earn 30 cents, if he is paid 4 cents for picking each quart?

Dividing by 6

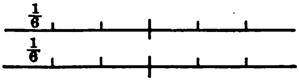
136. One of the six equal parts of one is **one sixth**, $\frac{1}{6}$.



137. Exercise:

1. What are 2 of the six equal parts of 1 called?
2. Read: $\frac{1}{6}$; $\frac{3}{6}$; $\frac{5}{6}$; $\frac{6}{6}$; $\frac{2}{6}$; $\frac{4}{6}$.
3. In $\frac{1}{2}$ there are how many sixths? $\frac{3}{6}=\frac{?}{2}$?
4. In $\frac{1}{3}$ there are how many sixths? $\frac{2}{6}=\frac{?}{3}$?
5. In $\frac{2}{3}$ there are how many sixths? $\frac{4}{6}=\frac{?}{3}$?
6. Here we see that:

   $\frac{1}{6}$ of $2=\frac{1}{6}+\frac{1}{6}$, or $\frac{2}{6}$, or $\frac{1}{3}$.



Show that:

7. $\frac{1}{6}$ of $3=\frac{3}{6}$, or $\frac{1}{2}$. 8. $\frac{1}{6}$ of $4=\frac{4}{6}$, or $\frac{2}{3}$. 9. $\frac{1}{6}$ of $5=\frac{5}{6}$.

Divide 15 by 6, thus:

$$6\overline{)15}$$

$2\frac{3}{6}$, or $2\frac{1}{2}$

Check: $6\times2+3=15$.

Divide 16 by 6, thus:

$$6\overline{)16}$$

$2\frac{4}{6}$, or $2\frac{2}{3}$

Check: $6\times2+4=16$.

138. Exercise:

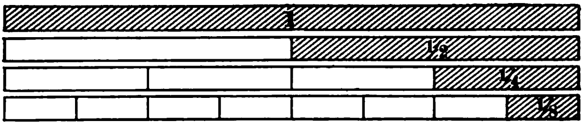
Divide by 6 and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	7	8	9	10	15	20	25	40
2.	100	125	140	160	175	200	400	500

3. How much did one bar of soap cost if 6 bars cost 25 cents? if 6 bars cost 40 cents?

Dividing by 8

139. One of the eight equal parts of one is **one eighth**, $\frac{1}{8}$.



140. Exercise :

1. How many eighths are there in 1?
2. How many eighths are there in $\frac{1}{4}$? in $\frac{1}{2}$?
3. How many eighths are there in $\frac{3}{4}$?
4. Read: $\frac{2}{8}$; $\frac{5}{8}$; $\frac{3}{8}$; $\frac{4}{8}$; $\frac{6}{8}$; $\frac{8}{8}$; $\frac{7}{8}$.
5. How many fourths are there in $\frac{2}{8}$? in $\frac{4}{8}$? in $\frac{6}{8}$?
6. How many halves are there in $\frac{4}{8}$? in $\frac{8}{8}$?
7. Show that $\frac{1}{8}$ of 2 is $\frac{2}{8}$, or $\frac{1}{4}$. (See page 155.)
8. Show that $\frac{1}{8}$ of 4 is $\frac{4}{8}$, or $\frac{1}{2}$.
9. Show that $\frac{1}{8}$ of 6 is $\frac{6}{8}$, or $\frac{3}{4}$.

141. Check each of these three answers; write each another way:

$$8\overline{)20} \qquad\qquad 8\overline{)34} \qquad\qquad 8\overline{)62}$$
$$2\tfrac{4}{8}\text{, or ?} \qquad\qquad 4\tfrac{2}{8}\text{, or ?} \qquad\qquad 7\tfrac{6}{8}\text{, or ?}$$

142. Exercise :

Divide by 8 and check:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	9	12	15	18	60	75	82	92
2.	25	30	38	50	55	70	90	99
3.	100	125	150	175	180	201	300	500

Review and Practice

143. Exercise:

Divide, and check results:

	a	*b*	*c*	*d*	*e*	*f*
1.	2)25	2)33	2)45	2)57	2)75	2)85
2.	3)16	3)25	3)32	3)50	3)80	3)92
3.	4)19	4)25	4)35	4)50	4)62	4)75
4.	6)20	6)35	6)50	6)65	6)80	6)97
5.	8)20	8)25	8)34	8)50	8)60	8)92
6.	2)101	2)115	2)125	2)175	2)225	2)375
7.	2)415	2)525	2)675	2)773	2)825	2)921
8.	3)100	3)125	3)140	3)200	3)250	3)280
9.	3)325	3)340	3)350	3)400	3)425	3)500
10.	4)143	4)150	4)182	4)193	4)225	4)226
11.	4)310	4)341	4)410	4)550	4)675	4)922
12.	6)100	6)136	6)200	6)284	6)345	6)380
13.	6)400	6)465	6)500	6)602	6)800	6)950
14.	8)100	8)150	8)220	8)310	8)406	8)508
15.	8)618	8)682	8)815	8)860	8)900	8)942

144. Exercise:

1. When handkerchiefs are sold 2 for 25 cents, how much is paid for each?

2. Julia paid 75 cents for 2 yards of velvet ribbon; how much was that a yard?

3. James bought 8 feet of rope for a sled; how many yards of rope did he buy?

4. How many bushels are there in 20 pecks? 30 pecks?

5. Mother paid 65 cents for 2 pounds of cheese; how much was that a pound?

6. When vinegar is selling at 50 cents a gallon, how much is it a quart? How much is it a pint?

7. Clara bought 6 Christmas bells for 10 cents; how much was that for each?

8. My father paid a carpenter $3 for 4 hours' work; what part of a dollar was that for each hour's work?

9. What is the average weight of two girls, one weighing 61 pounds and the other 70 pounds? (See page 150.)

10. For decorating our school we bought 8 yards of cotton bunting for 60¢ and 12 flags for 72¢. What was the cost of each yard of bunting and of each flag?

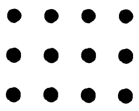
11. Cut from a sheet of paper a strip 9 inches long, measuring carefully with your ruler. Divide it into four equal parts and tell the length of each part.

12. Clare and Susan are each 8 years old, and Edna and Dorothy each 9 years old. What is the sum of their ages? What is their average age?

Multiplying by 10 and by 100

145. Here are 12 dots arranged in 3 rows of 4 dots each, or 4 columns of 3 dots each, which shows that:

$$3 \times 4 = 4 \times 3$$



In the same way we may show that:

$$10 \times 6 = 6 \times 10, \text{ or } 60$$

That is, 10 × 6 = 6 *with a cipher annexed.*

To multiply a whole number by 10, annex one 0 (place one 0 at the right).

146. Exercise:

State rapidly the answer to each of the following:

10 × 1
10 × 2
10 × 3
10 × 4
10 × 5
10 × 6
10 × 7
10 × 8
10 × 9
10 × 10
10 × 11
10 × 12

Multiply each of the following by 10, stating answers rapidly: 20; 16; 19; 100; 125; 140; 135; 120; 47; 99; 217; 63; 70; 810; 900; 950; 990.

147. 100 × 7 = 7 × 100, or 700; therefore,

To multiply a whole number by 100 annex two 0's.

148. Exercise:

State rapidly the answer to each of the following:

100 × 2
100 × 4
100 × 5
100 × 6
100 × 9
100 × 8
100 × 15
100 × 35
100 × 20
100 × 70
100 × 10
100 × 25

149. Exercise:

1. 10 two-pound boxes of sugar weigh how much?

2. 10 nickels are worth how many cents?

3. What is the cost of 10 eight-cent cards of buttons?

4. What is the cost of 10 pairs of shoelaces at 6¢ a pair? at 8¢ a pair?

5. 10 dimes are worth how many cents?

6. State the cost of 10 dozen clothespins at 5¢ a dozen; at 10¢ a dozen.

7. 10 nine-cent stamps will cost how much?

8. How many hours are there in 10 days?

9. Say the right number after =:

10 quarts = — pints
10 bushels = — pecks
10 feet = — inches
10 gallons = — quarts
10 yards = — feet
10 pecks = — quarts

10. How many minutes are there in 10 hours?

11. State the cost of 10 of each:

1-cent postal cards
4-cent rolls of shelf paper
5-cent balls of twine
2-cent stamps
3-cent closet hooks
8-cent flags

12. Ten 25-cent pieces are worth how many cents?

13. 100 dimes are worth how many cents?

14. 100 years is called a century; how many months are there in a century?

15. What is the weight of 100 two-pound sacks of salt?

16. Ten 100-dollar bills are worth how many dollars?

150. 1. Multiply 6 by 20. 2. Multiply 6 by 200.

$20 \times 6 = 6 \times 20$, or 120 $200 \times 6 = 6 \times 200$, or 1200

Work these examples this way:

$$\begin{array}{r} 6 \\ \underline{20} \\ 120 \end{array} \qquad\qquad \begin{array}{r} 6 \\ \underline{200} \\ 1200 \end{array}$$

151. Exercise:

Multiply:

	a	*b*	*c*	*d*	*e*	*f*
1.	5 20	8 30	6 40	2 50	7 60	8 90
2.	25 20	42 30	50 40	75 60	72 80	85 90
3.	7 200	8 300	9 500	6 700	7 800	9 900
4.	35 200	47 200	39 200	17 300	28 300	32 300

5. 30 doz. eggs are how many eggs? 50 doz.?

6. How many yards of bunting are there in 50 pieces each containing 24 yards?

7. 20 bales of straw, 100 lb. to the bale, weigh how much?

8. 40 boxes of crayon were bought for our school, each box containing 144 pieces. How many pieces were bought?

Dividing by 10 and by 100

152. Because $10 \times 4 = 40$, $40 \div 10 = 4$.

Therefore,

To divide a number ending in 0 by 10, cancel (cut off) the 0.

153. Exercise:

State rapidly the answers:

1. $20 \div 10$ $30 \div 10$ $200 \div 10$ $1000 \div 10$
2. $50 \div 10$ $80 \div 10$ $300 \div 10$ $2000 \div 10$
3. $70 \div 10$ $90 \div 10$ $350 \div 10$ $2700 \div 10$

4. How many dimes are there in 20¢? 50¢? 70¢? 30¢? 80¢? 40¢? 60¢? 90¢?

5. If 10¢ is the cost of *one pound*, *one package*, *one piece*, or *one yard* of anything, how many pounds, packages, pieces, or yards of it can be bought for 50¢? 30¢? 70¢? 20¢? 80¢? 90¢? 40¢? 60¢?

154. Because $100 \times 7 = 700$, $700 \div 100 = 7$.

Therefore,

To divide a number ending in two 0's by 100, cancel both 0's.

155. Exercise:

State rapidly the answers:

1. $200 \div 100$ $100 \div 100$ $1000 \div 100$
2. $400 \div 100$ $500 \div 100$ $5000 \div 100$
3. $300 \div 100$ $800 \div 100$ $9000 \div 100$
4. $700 \div 100$ $900 \div 100$ $4000 \div 100$

Dividing by Numbers Ending in 0

156. Since $20 \times 3 = 60$, $60 \div 20 = 3$.

The answer *3* may be found thus:

$$\begin{array}{r} 2\cancel{0})\underline{6\cancel{0}} \\ 3\cancel{0} \end{array}$$

Therefore,

To divide a number ending in 0 by another number ending in 0, cancel the 0 at the end of each and divide.

157. Exercise:

Copy, divide, and check:

	a	*b*	*c*	*d*	*e*	*f*
1.	20)20	30)60	20)60	40)80	20)80	30)90
2.	20)100	30)120	50)150	40)120	20)160	30)300
3.	30)210	40)160	40)240	50)250	40)400	50)350

4. Read examples 1–3, and name the answers at sight.

158. Since $200 \times 3 = 600$, $600 \div 200 = 3$.

The answer *3* may be found thus:

$$\begin{array}{r} 2\cancel{0}\cancel{0})\underline{6\cancel{0}\cancel{0}} \\ 3\cancel{0}\cancel{0} \end{array}$$

Therefore,

To divide a number ending in two 0's by another number ending in two 0's, cancel both 0's at the end of each number and divide.

159. Exercise:

Copy, divide, and check:

	a	*b*	*c*	*d*	*e*
1.	100)200	200)400	300)600	300)900	400)800
2.	400)1200	500)1000	400)2000	500)2500	500)5000
3.	600)3000	600)4200	700)5600	700)7000	600)4800

Multiplying by 11 and by 12

160. Exercise:

Multiply:

1.	11	11	11	11	11	11	11	11
	2	3	4	5	6	7	8	9

Say the right number where each line is:

2. 11 × 1 = 1 × 11, or — 3. 11 × 2 = 2 × 11, or —
4. 11 × 3 = 3 × 11, or — 5. 11 × 4 = 4 × 11, or —
6. 11 × 5 = 5 × 11, or — 7. 11 × 6 = 6 × 11, or —
8. 11 × 7 = 7 × 11, or — 9. 11 × 8 = 8 × 11, or —
10. 11 × 9 = 9 × 11, or — 11. 11 × 10 = 10 × 11, or —

12. State rapidly and learn the answer to each:

11 × 1
11 × 2
11 × 3
11 × 4
11 × 5
11 × 6
11 × 7
11 × 8
11 × 9
11 × 10

Multiply:

13.	12	12	12	12	12	12	12	12
	2	3	4	5	6	7	8	9

Say the right number where each line is:

14. 12 × 2 = 2 × 12, or — 15. 12 × 3 = 3 × 12, or —
16. 12 × 4 = 4 × 12, or — 17. 12 × 5 = 5 × 12, or —
18. 12 × 6 = 6 × 12, or — 19. 12 × 7 = 7 × 12, or —
20. 12 × 8 = 8 × 12, or — 21. 12 × 9 = 9 × 12, or —

22. State rapidly and learn the answer to each:

12 × 1
12 × 2
12 × 3
12 × 4
12 × 5
12 × 6
12 × 7
12 × 8
12 × 9
12 × 10

161.

1 × 1 = 1	2 × 1 = 2	3 × 1 = 3	4 × 1 = 4
1 × 2 = 2	2 × 2 = 4	3 × 2 = 6	4 × 2 = 8
1 × 3 = 3	2 × 3 = 6	3 × 3 = 9	4 × 3 = 12
1 × 4 = 4	2 × 4 = 8	3 × 4 = 12	4 × 4 = 16
1 × 5 = 5	2 × 5 = 10	3 × 5 = 15	4 × 5 = 20
1 × 6 = 6	2 × 6 = 12	3 × 6 = 18	4 × 6 = 24
1 × 7 = 7	2 × 7 = 14	3 × 7 = 21	4 × 7 = 28
1 × 8 = 8	2 × 8 = 16	3 × 8 = 24	4 × 8 = 32
1 × 9 = 9	2 × 9 = 18	3 × 9 = 27	4 × 9 = 36
1 × 10 = 10	2 × 10 = 20	3 × 10 = 30	4 × 10 = 40
1 × 11 = 11	2 × 11 = 22	3 × 11 = 33	4 × 11 = 44
1 × 12 = 12	2 × 12 = 24	3 × 12 = 36	4 × 12 = 48
5 × 1 = 5	6 × 1 = 6	7 × 1 = 7	8 × 1 = 8
5 × 2 = 10	6 × 2 = 12	7 × 2 = 14	8 × 2 = 16
5 × 3 = 15	6 × 3 = 18	7 × 3 = 21	8 × 3 = 24
5 × 4 = 20	6 × 4 = 24	7 × 4 = 28	8 × 4 = 32
5 × 5 = 25	6 × 5 = 30	7 × 5 = 35	8 × 5 = 40
5 × 6 = 30	6 × 6 = 36	7 × 6 = 42	8 × 6 = 48
5 × 7 = 35	6 × 7 = 42	7 × 7 = 49	8 × 7 = 56
5 × 8 = 40	6 × 8 = 48	7 × 8 = 56	8 × 8 = 64
5 × 9 = 45	6 × 9 = 54	7 × 9 = 63	8 × 9 = 72
5 × 10 = 50	6 × 10 = 60	7 × 10 = 70	8 × 10 = 80
5 × 11 = 55	6 × 11 = 66	7 × 11 = 77	8 × 11 = 88
5 × 12 = 60	6 × 12 = 72	7 × 12 = 84	8 × 12 = 96
9 × 1 = 9	10 × 1 = 10	11 × 1 = 11	12 × 1 = 12
9 × 2 = 18	10 × 2 = 20	11 × 2 = 22	12 × 2 = 24
9 × 3 = 27	10 × 3 = 30	11 × 3 = 33	12 × 3 = 36
9 × 4 = 36	10 × 4 = 40	11 × 4 = 44	12 × 4 = 48
9 × 5 = 45	10 × 5 = 50	11 × 5 = 55	12 × 5 = 60
9 × 6 = 54	10 × 6 = 60	11 × 6 = 66	12 × 6 = 72
9 × 7 = 63	10 × 7 = 70	11 × 7 = 77	12 × 7 = 84
9 × 8 = 72	10 × 8 = 80	11 × 8 = 88	12 × 8 = 96
9 × 9 = 81	10 × 9 = 90	11 × 9 = 99	12 × 9 = 108
9 × 10 = 90	10 × 10 = 100	11 × 10 = 110	12 × 10 = 120
9 × 11 = 99	10 × 11 = 110	11 × 11 = 121	12 × 11 = 132
9 × 12 = 108	10 × 12 = 120	11 × 12 = 132	12 × 12 = 144

162. Exercise:

TO THE TEACHER. There are 144 combinations in the multiplication tables, page 165. If the order of factors in these tables is disregarded, and 3 × 4 and 4 × 3 are considered one combination, these 144 combinations are all included in the following 78. Return frequently to this exercise for drill, especially on the products of combinations printed in heavy type, which are the most difficult to learn.

The Seventy-Eight Multiplication Combinations

Name each product at sight:

4 × 1
9 × 2
4 × 4
8 × 8
10 × 7
7 × 4
6 × 2
11 × 8
7 × 7
7 × 1
8 × 3
12 × 9
2 × 2
11 × 3
9 × 4
6 × 6
12 × 8
5 × 1
5 × 3
10 × 5

10 × 1
5 × 2
12 × 11
5 × 5
4 × 3
8 × 7
1 × 1
11 × 5
8 × 4
11 × 1
10 × 3
12 × 4
6 × 4
4 × 2
9 × 7
12 × 2
8 × 5
9 × 6
7 × 2
7 × 5

11 × 11
10 × 6
9 × 8
9 × 1
3 × 2
12 × 6
8 × 1
6 × 5
12 × 10
6 × 1
9 × 3
11 × 7
8 × 6
5 × 4
10 × 9
12 × 1
12 × 12
6 × 3
10 × 4
11 × 10

8 × 2
11 × 4
12 × 5
2 × 1
11 × 2
7 × 3
12 × 7
11 × 9
12 × 3
3 × 1
10 × 2
7 × 6
3 × 3
10 × 8
9 × 9
9 × 5
11 × 6
10 × 10

Multiplying by Any Number of Two Figures

163. Multiply 268 by 32.

This shows the complete work:		*In practice write only this:*
	268	268
	32	32
$2 \times 268 =$	536	536
$30 \times 268 =$	8040	804
$32 \times 268 =$	8576	8576

164. Exercise:

Copy, and multiply:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	47 13	52 15	61 17	58 22	67 23	76 19	63 42	86 26
2.	65 27	73 32	78 37	84 35	68 41	51 38	74 48	83 76
3.	59 47	66 49	62 54	97 51	95 56	79 64	82 69	91 83
4.	69 63	77 69	88 73	93 79	75 68	87 87	72 65	98 92
5.	81 79	89 83	94 86	96 93	99 99	85 57	64 58	92 96
6.	427 12	342 13	214 24	209 16	198 39	380 22	176 42	409 21

Change multipliers in examples 1–6 to 29 and multiply; change them to 34 and multiply; to 53; to 75; to 86.

165. Exercise:

Write as one number:

1. 2 hundreds + 4 tens + 6 units.

2. 5 thousands + 3 hundreds + 4 units.

3. 6 thousands + 8 tens + 6 units.

4. Name instantly the sums; the differences:

55	54	46	47	44	58	64	77
30	40	30	20	40	20	30	20

Copy and add:

	a	*b*	*c*
5.	875	962	758
	348	875	996
	765	933	827
6.	$275.25	$378.09	$397.14
	76.46	58.92	92.86
	85.78	9.87	195.28

Copy, subtract, and check:

	a	*b*	*c*
7.	8796	7621	9200
	1932	1679	7856
8.	$100.00	$725.00	$475.06
	87.65	189.25	187.28

Do these 7 examples in 3½ minutes:

9. Add:
275
384
726

10. Subtract:
576
89

11. Multiply:
758
6

12. Multiply:
$8.69
7

13. Divide:
6)864

14. Add:
758
326
859

15. Subtract:
750
177

166. Exercise :

1. Start at 1 and add 4 and 5 in turn until the sum is 46; name results only. Thus, *1, 5, 10, 14,* and so on.

2. Start at 51 and subtract 6 and 4 in turn until the result is 1. Thus, *51, 45, 41, 35,* and so on.

3. What change should you receive from a 25-cent piece if the amount of your purchase is:

24¢? 6¢? 10¢? 8¢? 2¢? 11¢? 14¢? 16¢?
22¢? 1¢? 12¢? 9¢? 5¢? 20¢? 13¢? 7¢?

4. If you are making change for a dollar and giving half of it in dimes and half in nickels, how many dimes should you give? how many nickels?

5. State four ways in which you can give the right change if you sell something for twelve cents and are given a 25-cent piece in payment.

5 10 4 1 3 8 2 7 6 12 11 9

6. Multiply each of the above numbers by 5 and add 10 to the product; multiply each by 6 and add 4 to the product.

7. Multiply each of the above numbers by 7 and add 5 to the product; multiply each by 8 and add 6 to the product.

8. Multiply each of the above numbers by 9 and add 7 to the product.

9. Name at sight the products:

10 × 11 11 × 11 12 × 12 12 × 9 10 × 17
12 × 11 20 × 7 12 × 8 30 × 9 12 × 7

167. Exercise:

Divide at sight and add 5 to each quotient.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	5)35	5)55	5)25	5)40	5)30	5)50	5)60	5)45
2.	6)24	6)42	6)66	6)48	6)54	6)60	6)30	6)72
3.	7)35	7)49	7)63	7)70	7)77	7)42	7)56	7)84
4.	8)80	8)32	8)48	8)64	8)96	8)88	8)56	8)72
5.	9)36	9)90	9)54	9)81	9)99	9)72	9)63	9)108

6. Divide each of the following numbers by 4; by 6; by 7; by 8; by 9. Tell the quotient and the remainder:

40 30 20 45 35 41 39 50 42

7. Repeat the table of 8's beginning with 8 × 12.

8. Repeat the table of 9's beginning with 9 × 12.

9. If the price of a hand-painted candy box is $1.25 and if the price when the box is filled with a pound of candy is $2.75, what is the price of the pound of candy?

10. Cut from a sheet of paper a 4-inch square; fold it to make 2-inch squares and tell how many it contains.

11. If you spend 11¢ twice a week for moving picture shows and 6¢ three times a week for ice cream cones, how much would you spend in 10 weeks for both? What you spend in the 10 weeks for both is how much more than enough to buy 15 thrift stamps?

12. Use a calendar and show that you can find the day of the week on which any day of any month of this year comes.

What You Should Be Able to Do When You Have Finished This Chapter

You should be able to :

1. Count by 1's, 2's, 3's, 4's, 5's, and 10's forwards and backwards between 1 and 100, beginning at different numbers.

2. Read and write any number of four figures or less, and copy such numbers correctly from a printed list or as your teacher dictates them.

3. Name correctly the sums on page 72 at the rate of about 60 a minute, and the differences at the rate of about 50 a minute.

4. Add and subtract correctly numbers of four figures or less and check your work.

5. Give instantly any product in the multiplication tables, page 166, and apply these tables.

6. Divide by any number of one figure and check results.

7. Apply what you have learned in addition, subtraction, multiplication, and division to the solution of the everyday problems which are adapted to your grade.

8. Estimate in terms of the measures you have studied, pages 120–129 ; test your estimates ; tell of your experiences in buying or selling by these measures, and the prices, where you live, of the articles bought or sold.

9. Tell the time correctly by the clock, use the calendar correctly, and read the thermometer.

10. Tell of ways of earning and saving ; also show a neat record of what you receive and what you spend each week or each month.

CHAPTER III

Reading and Writing Numbers

(Review pages 70–71)

1. 1. Beginning at the right, tell for what number each of these figures stands: 2387.

2. How many *ones* make 1 *ten?*

3. How many *tens* make 1 *hundred?*

4. How many *hundreds* make 1 *thousand?*

5. Read: 1000; 2000; 3000; 4000; 5000; 6000; 7000; 8000; 9000.

You will soon need to read large numbers. You will see them, for instance, on license tags of automobiles, on cars, on posters, and in newspapers.

2. Thousands are counted up to 999 thousand.

Ten thousand is written **10,000**. **One hundred thousand** is written **100,000**.

3. Exercise:

1. Read: 14,000; 16,000; 25,000; 32,000; 60,000; 85,000; 400,000; 700,000; 800,000.

Write in figures:

2. eleven thousand.
3. twenty thousand.
4. fifty-six thousand.
5. sixty-seven thousand.
6. two hundred thousand.
7. three hundred thousand.

4. Name the periods in the table below. How many places in each period? How are these periods separated? Read the names of all the places.

Table

Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Units
4	5	0,	2	0	7,	0	4	8
Millions **3d period**			**Thousands** **2d period**			**Units** **1st period**		

The number in the table is read *four hundred fifty million two hundred seven thousand forty-eight.*

5. **Exercise:**

Read, and write from dictation:

1.	2.	3.	4.	5.
14,275	675,896	389,606	260,045	70,025
175,162	25,240	875,007	768,590	7,200,160
256,702	901,004	48,756	900,400	35,875,642

6. Write five large numbers like those in examples 1–5, point them off into periods, and read them aloud.

7. Find in the newspapers or magazines four large numbers like those you have just read. Write them on the blackboard tomorrow and tell how they were used.

6. Exercise:

Write in figures the numbers in the sentences below:

1. The license number on our automobile is sixty thousand forty-five.

2. The moon is about two hundred thirty-nine thousand miles from the earth.

3. Mary found out that her heart beats one hundred twenty-six thousand seven hundred twenty times in twenty-four hours.

4. In the World War the total number of lives lost in both Army and Navy from the Declaration of War to May 1, 1919, was one hundred twenty-two thousand five hundred; of these forty-eight thousand nine hundred nine were battle deaths.

5. Sound travels in air about sixty-four thousand two hundred feet in a minute.

6. Most years contain five hundred twenty-five thousand six hundred minutes.

7. It is estimated that one hundred goldfinches will eat about one hundred ten thousand insects a day.

8. About one hundred sixty million people speak the English language.

9. During twenty months of the World War the Red Cross canteens in the United States distributed free five million six hundred four thousand three hundred forty-nine chocolate bars, and ten million eight hundred fifty-two thousand three hundred fifty-two cookies, doughnuts, and pies.

Roman Notation

7. In the Roman system:

I = 1 V = 5 X = 10 L = 50 C = 100
D = 500 M = 1000

Note. The number for which a letter stands is called the **value** of the letter.

8. If a letter is repeated, its value is repeated.

Thus, II = 2; III = 3; XX = 20; CC = 200; MMM = 3000.

9. If a letter is written before one of greater value, the difference of their values is expressed.

Thus, IV = 4; IX = 9; XL = 40; XC = 90.

10. If a letter or a combination of letters is written after a letter of greater value, the sum of the values is expressed.

Thus, VI = 6; XIII = 13; LV = 55; LIX = 59.

11. **Table**

Units	Tens	Hundreds
I = 1	**X = 10**	**C = 100**
II = 2	**XX = 20**	**CC = 200**
III = 3	**XXX = 30**	**CCC = 300**
IV = 4	**XL = 40**	**CD = 400**
V = 5	**L = 50**	**D = 500**
VI = 6	**LX = 60**	**DC = 600**
VII = 7	**LXX = 70**	**DCC = 700**
VIII = 8	**LXXX = 80**	**DCCC = 800**
IX = 9	**XC = 90**	**CM = 900**

12. In writing numbers other than those given in the table of section 11, hundreds are written after thousands, tens after hundreds, and units after tens.

Thus, 1567 = 1000 + 500 + 60 + 7 is written
MDLXVII = M + D + LX + VII.

NOTE. IIII = 4; XXXX = 40; CCCC = 400, are also in use.

13. Exercise:

Write by the Roman method:

1. The nine tens. 2. The nine hundreds.

Write by the Roman method the numbers between:

3. 30 and 40. 4. 60 and 70. 5. 90 and 100.

Write by the Roman method the following numbers:

6. 1492 7. 1776 8. 1620 9. 1732
10. 1809 11. 1925 12. 1914 13. 1918
14. 1924 15. 1927 16. 1823 17. 1799

Write in figures:

18. XIV 19. XIX 20. XC
21. LXI 22. LIX 23. LXXXIV
24. XCIII 25. MCM 26. XLIV
27. MCMXXI 28. MCMXVI 29. MDCCCLXV
30. MDCCCXII 31. MCMXXII 32. MDCCLXXVI

33. Name three or more places where you have seen Roman numerals used.

14. Exercise :

1. Add the numbers in each column. Add upwards. Check by adding downwards. Try to add these columns correctly at the rate of not less than four a minute.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*
	8	2	6	5	7	9	4	3	1	7	6	2
	2	4	3	1	5	8	6	7	7	4	4	5
	5	4	1	4	3	2	8	5	8	3	3	1
	6	9	5	4	2	3	1	9	9	8	9	8
	3	2	4	6	4	7	3	6	3	2	8	9
	7	8	9	2	6	4	7	5	4	9	7	5
	9	3	7	8	1	6	5	2	5	4	5	7
	1	5	8	7	9	5	2	1	6	5	2	3
	4	7	2	3	8	1	9	4	2	1	9	6
	9	8	7	6	2	4	1	3	8	6	1	4
2.	9	4	5	7	3	2	6	5	1	4	8	7
	4	6	8	6	5	3	9	3	5	6	2	8
	3	5	7	4	9	8	1	8	4	9	7	6
	5	8	9	1	7	6	3	7	9	7	6	4
	6	1	1	8	6	4	5	9	7	8	5	6
	2	3	6	2	8	5	4	1	6	2	9	5
	7	9	2	6	4	9	7	4	8	1	4	1
	1	7	3	7	1	7	8	2	2	3	3	9
	8	2	5	3	2	1	2	6	6	5	7	2
	4	6	4	5	8	2	8	5	3	6	1	3

To the Teacher. Time the pupils to find out how long it takes each to get the answers to all the examples on this page. Encourage each to try to better his record. Drill.

15. Exercise:

(The fastest and surest worker in a class of fourth-grade pupils found the correct answers to all the examples on this page in 3½ minutes, and the slowest worker found them in 5½ minutes. How near can you come to the better of these records?)

Add at sight from left to right:

1. 2 + 3 + 5 + 7 + 3 + 8 2. 8 + 2 + 6 + 1 + 3 + 9

3. 3 + 4 + 8 + 9 + 6 + 7 4. 9 + 6 + 7 + 5 + 1 + 4

Name at sight each sum:

5. 45 + 52 (think 97) 6. 48 + 37 (think 48, 78, 85)

7. 20 + 10 8. 38 + 20 9. 21 + 32 10. 35 + 15

11. 48 + 22 12. 46 + 31 13. 25 + 36 14. 55 + 27

Copy and add upwards. Check by adding downwards.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
15.	12	14	37	22	15	31	18	44
	33	21	52	35	27	24	27	63
	54	34	63	28	51	91	48	59
	41	56	25	77	88	39	51	25
	11	17	30	62	45	48	28	32
	29	38	56	34	39	76	46	29
16.	26	17	28	47	91	37	40	36
	45	25	81	68	73	51	62	29
	93	36	49	83	14	13	56	43
	81	93	60	72	21	42	23	62
	76	47	53	15	32	63	39	81
	54	82	27	24	54	93	51	33
	42	59	18	51	67	32	62	42
	61	72	56	63	12	71	48	70

16. Exercise:

(The fastest and surest worker in a class of fourth-grade pupils found all the correct answers in example 1 in 2 minutes, and those in example 2 in 2½ minutes. The class averaged 5 minutes for example 1, and 8½ minutes for example 2. How near can you come to the best record?)

Add upwards. Check by adding downwards.

	a	*b*	*c*	*d*	*e*	*f*
1.	341	623	784	532	879	105
	476	255	372	807	535	641
	192	379	834	978	379	985
	603	582	659	456	547	426
	582	355	278	953	325	351
	772	672	354	221	112	379
2.	568	742	379	368	729	845
	617	422	415	856	666	509
	434	531	632	425	876	225
	586	868	606	632	843	299
	970	519	519	514	541	786
	456	803	798	719	932	477
	931	791	354	843	787	332
	807	587	678	311	619	719
	556	139	201	415	383	596

3. A man paid $45 for a suit of clothes, $40 for an overcoat, and $ 7.50 for a hat. How much did he pay for all?

4. During one season a school basket-ball team played six games, making the following scores: 39 points, 17 points, 21 points, 3 points, 44 points, and 27 points. How many points did the team score that season?

17. Exercise:

1. Time yourself to see how quickly you can give all the differences in exercise 4, page 72.

2. Subtract at sight 1 from each number above the line. In the same way subtract 2, 3, and so on up to 9.

10 30 50 20 60 90 70 40 80

1 2 3 4 5 6 7 8 9

3. Change the last figure of each number above the line in example 2 to 1, and subtract as before; change the last figure to 2, to 3, and so on up to 9, each time subtracting the numbers below the line.

Name at sight the differences. Name them again and check.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
4.	70	90	46	96	97	48	97	52
	40	60	10	30	30	18	27	21
5.	47	59	37	75	85	66	76	89
	26	44	11	31	43	15	24	17
6.	200	600	400	250	750	325	475	595
	100	500	100	100	400	300	200	100
7.	800	900	900	850	780	920	725	856
	200	300	500	200	300	600	700	300
8.	821	765	795	720	903	706	818	777
	800	665	195	120	703	106	518	277

18. Exercise:

Copy, subtract, and check (review pages 81 and 131):

	a	b	c	d	e	f
1.	3943	4127	7634	4352	8589	3981
	3602	2015	3428	3147	4191	2768
2.	4762	5660	8500	9000	7483	8207
	3574	2934	3942	1776	6987	5148

Copy, subtract, and check:

	a	b	c	d	e
3.	36894	45932	86405	57619	95832
	24788	37658	34341	48179	76938
4.	81781	98096	46007	88369	73421
	38793	39432	39213	49471	45638

Copy, subtract, and check:

	a	b	c	d
5.	415634	638456	378147	596834
	274519	384527	197632	479705
6.	765432	257162	893465	989006
	278643	198347	379847	398715
7.	$415.65	$505.50	$980.00	$348.05
	319.86	490.75	456.45	259.67
8.	$1500.50	$3984.22	$5763.89	$9841.32
	987.60	1995.68	4794.59	7956.48
9.	$2756.81	$7000.00	$5000.00	$9010.50
	88.90	1842.25	1250.75	2750.75

19. Exercise:

1. Harry's father bought a 1000-mile railroad ticket. He has traveled 456 miles on it. For how many more miles may he use it?

2. Thelma is reading a book which has in it 24 chapters and 314 pages. She has read the first three chapters ending at the bottom of page 39. How many chapters has she yet to read? How many pages?

3. During July Charles sold 1440 newspapers and 184 magazines, for which he received $ 56.40. During August he sold 1632 newspapers and 203 magazines, for which he received $ 63.09. How many more newspapers did he sell in August than in July? How many more magazines? How much more money did he receive?

4. Earl's father sells coal. He told Earl that he had just weighed 3 truck loads and that the first weighed 9720 pounds, the second 9635 pounds, and the third 9940 pounds. These weights included the weight of the truck, which was 5400 pounds. He asked Earl to find the weight of each load of coal. Earl found the correct weights. What were they?

5. The people of a town conducted a five-day campaign for the Roosevelt Memorial Fund. They collected $ 4250. The first day they collected $ 585.50. At the end of the second day they had $ 1073.25, at the end of the third day $ 1894, and at the end of the fourth day $ 2650.50. How much did they collect the second day? the third day? the fourth day? the fifth day?

20. Exercise:

1. Name at sight the products:

6×9 6×7 9×6 8×7 7×9 7×8 9×7

2. Repeat the table of 6's; 7's; 8's; 9's.

3. Your teacher will test you to make sure that you know your multiplication tables. Be ready to answer correctly her questions.

4. Write on a sheet of paper in a column:

$1 \times 1 = 1$, $2 \times 2 = 4$, $3 \times 3 = 9$, and so on to $25 \times 25 = 625$

Use your pencil to find the products only when you need to. Keep this sheet and review it until you know all the products.

State the missing numbers at sight:

5. $7 \times ? = 63$ $12 \times ? = 72$ $11 \times ? = 110$ $12 \times ? = 120$
6. $8 \times ? = 56$ $12 \times ? = 108$ $11 \times ? = 121$ $12 \times ? = 132$
7. $10 \times 11 = ?$ $10 \times 13 = ?$ $10 \times 17 = ?$ $10 \times 21 = ?$
8. $10 \times 30 = ?$ $10 \times 45 = ?$ $10 \times 50 = ?$ $10 \times 75 = ?$

9. Name two numbers whose product is: 15; 21; 35; 28; 42; 56; 63; 72; 54; 45; 40; 88; 60; 48; 96; 110; 120; 132.

10. **30 40 20 60 70 50 90 80**

Multiply at sight each number above the line by: 2; 3; 4; 5; 6; 7; 8; 9.

11. **200 400 600 300 700 900 800 500**

Multiply each number above the line by: 4; 6; 2; 5; 3; 9; 7; 8.

21. Multiply 48 by 2.

Think quickly: 2 times 40 are 80 and 2 times 8 are 16; 80 and 16 are 96.

22. Exercise:

Multiply:

	a	*b*	*c*	*d*
1.	34 by 2	45 by 2	28 by 2	38 by 2
2.	24 by 3	26 by 3	42 by 3	56 by 3
3.	25 by 4	44 by 4	55 by 4	64 by 4
4.	27 by 5	45 by 5	36 by 5	63 by 5
5.	13 by 6	16 by 6	24 by 6	35 by 6
6.	14 by 7	35 by 7	23 by 7	16 by 8
7.	24 by 8	25 by 8	14 by 9	25 by 9

Find the cost of:

8. 2 cans of tomatoes at 16¢ a can.
9. 4 packages of raisins at 16¢ a package.
10. 3 cans of salmon at 18¢ a can.
11. 3 tea aprons at 25¢ each.
12. 4 yd. of ribbon at 8¢ a yard.
13. 3 window shades at 30¢ each.
14. 3 cans of stove polish at 15¢ each.
15. 2 bottles of olives at 50¢ each.
16. 2 bottles of maple sirup at 35¢ a bottle.
17. 3 cans of cherries at 30¢ a can.
18. 3 glasses of jelly at 28¢ a glass.

23. Multiply: 2 by 35 and tell how much 35 two-cent stamps cost.

Think quickly: 35 times 2 = 2 times 35, or 70.

24. Exercise:

Multiply:

	a	*b*	*c*	*d*
1.	2 by 30	2 by 50	2 by 18	2 by 48
2.	2 by 64	3 by 30	3 by 40	3 by 52
3.	3 by 18	4 by 20	4 by 25	4 by 32
4.	4 by 45	4 by 60	5 by 50	5 by 14
5.	5 by 18	5 by 24	6 by 40	6 by 14
6.	6 by 22	7 by 50	7 by 13	8 by 80
7.	8 by 16	8 by 24	9 by 60	9 by 41

8. Find the cost of 40 yd. carpet at $2 a yard.

Think: 40 times $2 = 2 times $40, or $80.

Find the cost of:

9. 20 yd. silk at $3 a yard.
10. 30 head of sheep at $10 a head.
11. 14 bbl. of apples at $4 a barrel.
12. 16 pt. of milk at 8¢ a pint.
13. 9 cans of corn at 15¢ a can.
14. 18 lb. of corn meal at 5¢ a pound.
15. 14 lb. of rolled oats at 8¢ a pound.
16. 19 lb. of hominy at 10¢ a pound.
17. 75 pear trees at $1 each.
18. 12 yd. ribbon at 8¢ a yard.
19. 15 bu. of potatoes at $3 a bushel.
20. 18 boxes of matches at 5¢ a box.

25. Multiply 465 by 359:

This shows the complete work:

$$\begin{array}{rrl} & 465 & \textbf{Multiplicand} \\ & 359 & \textbf{Multiplier} \\ \cline{2-2} 9 \times 465 = & 4185 & \\ 50 \times 465 = & 23250 & \text{(see section 150, p. 161)} \\ 300 \times 465 = & 139500 & \\ \cline{2-2} 359 \times 465 = & 166935 & \textbf{Product} \end{array}$$

In practice write only this:

$$\begin{array}{r} 465 \\ 359 \\ \hline 4185 \\ 2325 \\ 1395 \\ \hline 166935 \end{array}$$

Check: Multiply 359 by 465; the product should be 166935.

26. Exercise:

Copy and multiply. Check results in examples 1–4 by performing the multiplication a second time.

	a	*b*	*c*	*d*	*e*	*f*
1.	342	456	401	523	536	542
	28	34	39	42	48	38
2.	497	509	599	612	607	618
	51	57	69	63	98	42
3.	574	676	602	731	756	708
	83	78	79	81	99	63
4.	706	811	839	899	908	918
	59	67	73	86	95	75

Check results in examples 5 and 6 as in section 25.

5.	452	410	506	576	533	550
	121	193	167	190	156	124
6.	603	623	783	755	706	732
	251	340	469	499	518	639

27. Multiply 978 by 206.

	This shows the complete work:		*In practice write only this:*
	978		978
	206		206
6 × 978 =	5868		5868
200 × 978 =	195600	(see section 150, p. 161)	1956
206 × 978 =	201468		201468

Check by performing the multiplication a second time.

28. Exercise:

Copy and multiply. Check results by performing the multiplication a second time.

	a	*b*	*c*	*d*	*e*	*f*
1.	342	369	309	468	470	536
	209	108	406	305	505	607
2.	517	588	677	602	735	749
	501	703	708	605	803	808
3.	698	770	846	968	936	979
	109	408	509	702	904	609
4.	1435	1623	2130	2316	2265	2514
	233	342	367	287	411	433
5.	2115	1388	3120	2346	2407	2708
	521	416	323	422	341	576
6.	2311	2065	3108	3222	2416	3726
	102	206	209	304	303	404
7.	1476	2337	2981	3141	3250	3521
	425	509	706	905	606	496

29. Exercise:

Copy and multiply, timing yourself on each line of examples. Work them again and try to better your record.

1. 26 × 369
2. 57 × 652
3. 49 × $ 6.72
4. 43 × 428
5. 38 × 535
6. 58 × $ 5.47
7. 89 × 567
8. 68 × 703
9. 89 × $ 4.98
10. 561 × 640
11. 472 × 397
12. 973 × $ 3.93
13. 876 × 461
14. 567 × 478
15. 595 × $ 4.29
16. 337 × 879
17. 435 × 692
18. 784 × $ 8.99

Copy and multiply:

(After copying any one of these 18 examples, in how much less than 2 minutes can you get the right answer to it? One very fast and sure worker in a class of fourth-grade pupils found the correct answers to the 18 examples in 12 minutes.)

19. 634 × 8423
20. 278 × 9043
21. 465 × $ 21.69
22. 856 × 3976
23. 832 × 6347
24. 734 × $ 47.94
25. 467 × 6785
26. 526 × 8916
27. 873 × $ 32.49
28. 792 × 7736
29. 609 × 7994
30. 652 × $ 68.98
31. 527 × 5398
32. 843 × 4587
33. 437 × $ 56.65
34. 738 × 4949
35. 678 × 6328
36. 398 × $ 28.56

Multiply the numbers to the left of each line by each number to the right of the line:

37.	812	*a.* 81	38.	580	*a.* 752	39.	6438	*a.* 564
40.	537	*b.* 68	41.	709	*b.* 867	42.	5774	*b.* 876
43.	366	*c.* 57	44.	686	*c.* 473	45.	7618	*c.* 692
46.	898	*d.* 49	47.	927	*d.* 529	48.	3895	*d.* 869
49.	775	*e.* 36	50.	479	*e.* 638	51.	9987	*e.* 978

30. Exercise:

1. What will 56 bushels of wheat weigh if one bushel weighs 60 lb.? What will 100 bushels weigh?

2. A barrel of salt weighs 280 lb. What will a wagon loaded with 10 barrels of salt weigh, if the wagon weighs 1756 lb.?

3. Find the weight of 12 bales of cotton, each bale weighing 500 lb.

4. If a man takes 2112 steps in walking a mile, how many steps of the same length should he take in walking 12 miles?

5. How many pounds of fertilizer should be sown on 18 acres, if 400 lb. are sown to the acre?

6. At the rate of $25,000 per mile, what will be the cost of making 15 miles of good roads?

7. If a man's salary is $1200 per year and his expenses $75 per month, how much has he left at the end of the year, provided that he saves the remainder?

8. Mrs. Marshall buys two quarts of milk each day at 14¢ a quart. What is her milk bill for March? for November?

9. How much did a grocer receive from his sales of bread in one day if he sold 84 fourteen-cent loaves and 120 ten-cent loaves?

To THE TEACHER. A part or the whole of a recitation should now and then be devoted to having the pupils describe in a general way how the problems of an exercise should be solved. Thus, in example 2: *Multiply 280 pounds by 10 and add 1756 pounds to the product.*

31. Exercise:

Name rapidly the quotient and the remainder in each:

	a	b	c	d	e	f
1.	6)41	6)50	6)56	6)59	6)47	6)39
2.	7)44	7)51	7)55	7)61	7)65	7)48
3.	7)69	8)50	8)55	8)59	8)62	8)73
4.	8)66	8)71	8)76	8)79	9)65	9)35
5.	9)70	9)74	9)79	9)58	9)83	9)61
6.	9)49	9)86	9)69	9)84	9)75	9)80

Name rapidly the quotient in each:

	a	b	c	d	e
7.	11)132	12)108	12)144	11)99	11)77
8.	11)121	12)96	11)110	12)84	12)48
9.	12)60	12)72	12)132	12)120	11)88
10.	20)180	20)120	20)200	20)140	20)220
11.	30)270	40)440	30)180	30)240	40)280
12.	40)480	50)300	40)360	40)200	50)450
13.	50)550	50)400	60)480	60)240	60)720

To THE TEACHER. As the pupil is now familiar with short division, an easy and natural way to approach long division is to compare the process with that of short division. The difference between the two processes is that in long division all the numbers used are expressed while in short division not all of them are expressed.

32. Divide 438 by 6.

Short Division

$$\begin{array}{r} 6\underline{)438} \\ 73 \end{array}$$

Although long division is not generally used when the divisor is a number of one figure, nevertheless, until you are familiar with the *steps* in long division, that is, until you know "what to do next," you may use to advantage a divisor of one figure in learning the *process* of long division.

Long Division

$$\begin{array}{rrl} & 73 & \textbf{Quotient} \\ \textbf{Divisor } 6 & \overline{)438} & \textbf{Dividend} \\ & \underline{42} & \\ & 18 & \\ & \underline{18} & \\ \end{array}$$

Check: $6 \times 73 = 438$.

These steps, which you can best learn by much practice work, are:

First, Divide.
Second, Write the quotient figure.
Third, Multiply.
Fourth, Subtract.
Fifth, Bring down the next figure.

33. Exercise:

Find the quotient in each of the following, first by short division, then by long division; check:

	a	*b*	*c*	*d*	*e*	*f*
1.	6)282	6)372	6)444	6)576	6)594	6)1332
2.	7)294	7)371	7)455	7)518	7)602	7)1561
3.	8)256	8)344	8)448	8)600	8)664	8)2672
4.	9)306	9)333	9)468	9)576	9)648	9)3465

Dividing by Numbers of Two Figures Each; Quotient, a Number of One Figure

34. Divide 98 by 32.

$$\begin{array}{rrl} & 3 & \textbf{Quotient} \\ \textbf{Divisor} & 32\overline{)98} & \textbf{Dividend} \\ & \underline{96} & \\ & 2 & \textbf{Remainder} \end{array}$$

Check: $32 \times 3 + 2 = 98$.

$98 = 9$ tens $+ 8$ units.

9 tens $\div$ 32 is 0 tens (9 is less than 32).

9 tens $+ 8$ units $= 98$ units.

98 units $\div$ 32 (estimate $9 \div 3$) $=$ 3 units.

Write 3 over the units.

Taking 32×3 units from 98 units, the remainder is 2.

In practice, estimate the quotient figure ($9 \div 3 = 3$). Write 3. Find the product of 32 and 3 and subtract the product from 98. Check.

35. Exercise:

Copy and divide (estimate the quotient figure):

1. $20\overline{)60}$ 2. $21\overline{)84}$ 3. $14\overline{)28}$ 4. $21\overline{)63}$

5. $22\overline{)88}$ 6. $21\overline{)86}$ 7. $31\overline{)68}$ 8. $22\overline{)89}$

9. $30\overline{)96}$ 10. $42\overline{)87}$ 11. $50\overline{)105}$ 12. $63\overline{)129}$

13. $42\overline{)129}$ 14. $61\overline{)188}$ 15. $50\overline{)459}$ 16. $11\overline{)58}$

17. $21\overline{)73}$ 18. $22\overline{)96}$ 19. $31\overline{)105}$ 20. $42\overline{)179}$

21. $52\overline{)117}$ 22. $63\overline{)256}$ 23. $54\overline{)175}$ 24. $44\overline{)189}$

25. $53\overline{)495}$ 26. $62\overline{)568}$ 27. $73\overline{)570}$ 28. $84\overline{)590}$

29. $82\overline{)660}$ 30. $94\overline{)380}$ 31. $95\overline{)500}$ 32. $94\overline{)580}$

33. $91\overline{)652}$ 34. $82\overline{)534}$ 35. $84\overline{)472}$ 36. $73\overline{)592}$

37. $81\overline{)423}$ 38. $72\overline{)546}$ 39. $91\overline{)643}$ 40. $84\overline{)512}$

36. Divide 174 by 39.

$$\begin{array}{r} 4 \\ 39\overline{)174} \\ \underline{156} \\ 18 \end{array}$$

Suggestion. Since 39 is nearly 40, estimate 17 ÷ 4 for the quotient figure.

To the Teacher. Since 39 is nearly 40, it is evident that the pupil will use 39 as a divisor more readily than he will 34, 35, or 36.

Check: $39 \times 4 + 18 = 174$.

37. Exercise:

Copy and divide (estimate the quotient figure):

1. $19\overline{)46}$
2. $19\overline{)63}$
3. $18\overline{)60}$
4. $18\overline{)86}$
5. $19\overline{)89}$
6. $27\overline{)60}$
7. $27\overline{)76}$
8. $28\overline{)92}$
9. $28\overline{)81}$
10. $29\overline{)95}$
11. $27\overline{)121}$
12. $28\overline{)156}$
13. $29\overline{)185}$
14. $38\overline{)176}$
15. $39\overline{)248}$
16. $48\overline{)250}$
17. $48\overline{)365}$
18. $49\overline{)314}$
19. $48\overline{)360}$
20. $49\overline{)400}$
21. $57\overline{)300}$
22. $58\overline{)360}$
23. $58\overline{)432}$
24. $59\overline{)431}$
25. $59\overline{)540}$
26. $67\overline{)210}$
27. $67\overline{)291}$
28. $68\overline{)354}$
29. $69\overline{)570}$
30. $69\overline{)641}$
31. $77\overline{)320}$
32. $77\overline{)491}$
33. $78\overline{)485}$
34. $78\overline{)650}$
35. $79\overline{)721}$
36. $87\overline{)195}$
37. $88\overline{)275}$
38. $89\overline{)730}$
39. $87\overline{)645}$
40. $89\overline{)820}$
41. $79\overline{)650}$
42. $87\overline{)632}$
43. $69\overline{)576}$
44. $88\overline{)454}$
45. $89\overline{)525}$
46. $77\overline{)436}$
47. $87\overline{)500}$
48. $79\overline{)603}$
49. $87\overline{)462}$
50. $78\overline{)573}$
51. $89\overline{)621}$
52. $79\overline{)537}$

38. Divide 156 by 54.

$$\begin{array}{r} 2 \\ 54\overline{)156} \\ \underline{108} \\ 48 \end{array}$$

SUGGESTION. The estimate ($15 \div 5 = 3$) is too high since 3×54, or 162, is more than 156.

Change the estimate to 2.

Check: $54 \times 2 + 48 = 156$.

39. Exercise:

Copy and divide (estimate the quotient figure):

1. $13\overline{)40}$
2. $14\overline{)48}$
3. $15\overline{)47}$
4. $21\overline{)60}$
5. $23\overline{)42}$
6. $22\overline{)80}$
7. $23\overline{)65}$
8. $24\overline{)90}$
9. $32\overline{)90}$
10. $34\overline{)65}$
11. $21\overline{)101}$
12. $22\overline{)102}$
13. $24\overline{)168}$
14. $32\overline{)120}$
15. $34\overline{)156}$
16. $34\overline{)250}$
17. $33\overline{)275}$
18. $35\overline{)162}$
19. $34\overline{)280}$
20. $32\overline{)283}$
21. $43\overline{)168}$
22. $44\overline{)175}$
23. $43\overline{)289}$
24. $44\overline{)296}$
25. $43\overline{)367}$
26. $52\overline{)103}$
27. $54\overline{)150}$
28. $51\overline{)151}$
29. $53\overline{)142}$
30. $52\overline{)460}$
31. $64\overline{)121}$
32. $63\overline{)185}$
33. $65\overline{)190}$
34. $63\overline{)492}$
35. $64\overline{)312}$
36. $72\overline{)142}$
37. $73\overline{)140}$
38. $74\overline{)220}$
39. $75\overline{)368}$
40. $74\overline{)574}$
41. $84\overline{)165}$
42. $84\overline{)250}$
43. $82\overline{)490}$
44. $84\overline{)500}$
45. $83\overline{)730}$
46. $91\overline{)180}$
47. $92\overline{)365}$
48. $93\overline{)275}$

40. Exercise:

1. The 25 girls in Mabel's room were given 125 tickets to sell for an entertainment. Each was given the same number of tickets. What was the number?

2. Frank set out 135 celery plants in rows, 15 plants to the row. How many rows were there?

3. Edna's father told her that he earned $225 in 45 days, the same wages each day, and asked her if she could tell him how much he earned each day. She told him the correct sum. What was it?

4. John saved $84 in 12 months. How much was that per month?

5. Four boys went 216 miles in a launch in 24 hours. What average distance did they go each hour?

6. Mr. Jones has a vacant lot containing 252 square yards. He gave the 28 boys of a school the use of it for a garden. How many square yards had each boy for his garden if they shared equally?

7. How many loads did Will's father make of 384 bu. of wheat if he hauled 48 bu. at each load?

384 bu. was the amount he hauled.
48 bu. was the amount he hauled at each load.
384 ÷ 48, or ? = the number of loads.

8. How many feet are there in 108 in.?

9. For how many months will $175 pay the rent of a house which rents for $25 a month?

10. 260 lb. of oats make how many bushels and how many pounds over, counting 32 lb. to the bushel?

Quotient, a Number of More than One Figure

41. Divide 758 by 21.

$$\begin{array}{r} 36 \\ 21\overline{)758} \\ \underline{63} \\ 128 \\ \underline{126} \\ 2 \end{array}$$

758 = 7 hundreds + 5 tens + 8 units.

7 hundreds ÷ 21 = 0 hundreds (21 is greater than 7).

7 hundreds + 5 tens = 75 tens.

75 tens ÷ 21 (estimate 7 ÷ 2) = 3 tens. Write 3 over the tens.

Multiply, subtract, and bring down.

128 units ÷ 21 (estimate 12 ÷ 2) = 6 units. Write 6 over the units. Multiply and subtract.

The quotient is 36 and the remainder is 2.

Check: 21 × 36 + 2 = 758.

In practice think:

75 ÷ 21 (estimate 7 ÷ 2) = 3; write 3 over the tens; 3 × 21 = 63; 75 − 63 = 12; bring down 8; 128 ÷ 21 (estimate 12 ÷ 2) = 6; write 6 over the units; 6 × 21 = 126; 128 − 126 = 2.

42. Exercise:

Copy and divide (estimate the quotient figures):

1. $11\overline{)136}$ 2. $11\overline{)259}$ 3. $11\overline{)584}$ 4. $11\overline{)896}$
5. $11\overline{)958}$ 6. $21\overline{)347}$ 7. $21\overline{)768}$ 8. $21\overline{)978}$
9. $22\overline{)958}$ 10. $22\overline{)1998}$ 11. $31\overline{)986}$ 12. $32\overline{)2099}$
13. $32\overline{)2690}$ 14. $32\overline{)2058}$ 15. $32\overline{)2886}$ 16. $42\overline{)897}$
17. $43\overline{)1897}$ 18. $42\overline{)3151}$ 19. $42\overline{)3997}$ 20. $44\overline{)3599}$
21. $52\overline{)1987}$ 22. $52\overline{)3989}$ 23. $51\overline{)4489}$ 24. $53\overline{)4499}$
25. $54\overline{)4490}$ 26. $61\overline{)2966}$ 27. $63\overline{)3481}$ 28. $64\overline{)6375}$
29. $63\overline{)5298}$ 30. $62\overline{)5900}$ 31. $72\overline{)6139}$ 32. $73\overline{)4915}$
33. $73\overline{)6298}$ 34. $74\overline{)6900}$ 35. $75\overline{)6270}$ 36. $84\overline{)4500}$

43. Divide 1351 by 29.

$$\begin{array}{r} 46 \\ 29\overline{)1351} \\ \underline{116} \\ 191 \\ \underline{174} \\ 17 \end{array}$$

In practice think:

135 ÷ 29 (estimate 13 ÷ 3) = 4; write 4 over the tens; 4 × 29 = 116; 135 − 116 = 19; bring down 1; 191 ÷ 29 (estimate 19 ÷ 3) = 6; write 6 over the units; 6 × 29 = 174; 191 − 174 = 17.

Check: 29 × 46 + 17 = 1351.

44. Exercise :

Copy and divide (estimate the quotient figures):

1. $19\overline{)610}$
2. $18\overline{)406}$
3. $19\overline{)256}$
4. $18\overline{)426}$
5. $19\overline{)486}$
6. $17\overline{)405}$
7. $28\overline{)370}$
8. $29\overline{)900}$
9. $28\overline{)682}$
10. $37\overline{)453}$
11. $37\overline{)1680}$
12. $38\overline{)2060}$
13. $29\overline{)2460}$
14. $39\overline{)3200}$
15. $38\overline{)3621}$
16. $47\overline{)1090}$
17. $48\overline{)3083}$
18. $49\overline{)4023}$
19. $49\overline{)4500}$
20. $49\overline{)4409}$
21. $57\overline{)1203}$
22. $58\overline{)2440}$
23. $59\overline{)3601}$
24. $59\overline{)4254}$
25. $59\overline{)5440}$
26. $69\overline{)2140}$
27. $66\overline{)2124}$
28. $67\overline{)4900}$
29. $68\overline{)3540}$
30. $69\overline{)6490}$
31. $78\overline{)2420}$
32. $79\overline{)4031}$
33. $77\overline{)3240}$
34. $79\overline{)6490}$
35. $78\overline{)7210}$
36. $87\overline{)3664}$
37. $86\overline{)2960}$
38. $88\overline{)4982}$
39. $89\overline{)7665}$
40. $89\overline{)8899}$
41. $89\overline{)6532}$
42. $79\overline{)5177}$
43. $87\overline{)5795}$
44. $89\overline{)5129}$
45. $78\overline{)5042}$
46. $87\overline{)6389}$
47. $79\overline{)4628}$
48. $78\overline{)5676}$
49. $86\overline{)4521}$
50. $88\overline{)4094}$
51. $67\overline{)5618}$
52. $88\overline{)4791}$
53. $77\overline{)5740}$
54. $78\overline{)4265}$
55. $88\overline{)5939}$
56. $79\overline{)4951}$

45. Divide 3684 by 64.

$$\begin{array}{r} 57 \\ 64\overline{)3684} \\ 320 \\ \hline 484 \\ 448 \\ \hline 36 \end{array}$$

In practice think:

The estimate (36 ÷ 6 = 6) is too high, since 6 × 64, or 384, is greater than 368. Change the estimate to 5, which is correct.

Multiply, subtract, bring down.

The estimate (48 ÷ 6 = 8) is too high, since 8 × 64, or 512, is greater than 484. Change the estimate to 7, which is correct.

Multiply and subtract.

Check: $64 \times 57 + 36 = 3684$.

46. Exercise:

Copy and divide (estimate the quotient figures):

1. $14\overline{)176}$	2. $14\overline{)275}$	3. $15\overline{)546}$	4. $16\overline{)476}$
5. $14\overline{)710}$	6. $26\overline{)489}$	7. $26\overline{)514}$	8. $25\overline{)468}$
9. $24\overline{)882}$	10. $24\overline{)426}$	11. $25\overline{)876}$	12. $35\overline{)634}$
13. $36\overline{)935}$	14. $34\overline{)967}$	15. $35\overline{)575}$	16. $25\overline{)1625}$
17. $24\overline{)1725}$	18. $36\overline{)1563}$	19. $34\overline{)1660}$	20. $36\overline{)2154}$
21. $37\overline{)2156}$	22. $44\overline{)1714}$	23. $43\overline{)1615}$	24. $45\overline{)2965}$
25. $44\overline{)3738}$	26. $54\overline{)1613}$	27. $54\overline{)4161}$	28. $55\overline{)1037}$
29. $55\overline{)4712}$	30. $52\overline{)3006}$	31. $66\overline{)1212}$	32. $65\overline{)3630}$
33. $65\overline{)4286}$	34. $66\overline{)5596}$	35. $67\overline{)4276}$	36. $76\overline{)1437}$
37. $76\overline{)2944}$	38. $74\overline{)2115}$	39. $73\overline{)6407}$	40. $74\overline{)6342}$
41. $84\overline{)1643}$	42. $84\overline{)6387}$	43. $85\overline{)6559}$	44. $86\overline{)5721}$
45. $83\overline{)5723}$	46. $94\overline{)3748}$	47. $94\overline{)8346}$	48. $95\overline{)4600}$

47. Divide 25,494 by 42.

$$\begin{array}{r} 607 \\ 42\overline{)25494} \\ \underline{252} \\ 294 \\ \underline{294} \end{array}$$

In practice think:
254 ÷ 42 (estimate 25 ÷ 4) = 6; write 6 over hundreds; 6 × 42 = 252; 254 − 252 = 2; bring down 9; 29 ÷ 42 (estimate 2 ÷ 4) = 0; write 0 over tens; bring down 4; 294 ÷ 42 (estimate 29 ÷ 4) = 7; write 7 over units; 7 × 42 = 294; 294 − 294 = 0.

Check: 42 × 607 = 25494.

48. Exercise:

Copy and divide:

	a	*b*	*c*
1.	$21\overline{)5775}$	$22\overline{)7612}$	$21\overline{)6384}$
2.	$22\overline{)8954}$	$31\overline{)9517}$	$25\overline{)7850}$
3.	$29\overline{)8874}$	$26\overline{)8034}$	$32\overline{)6688}$
4.	$32\overline{)6336}$	$31\overline{)3973}$	$32\overline{)3461}$
5.	$27\overline{)6620}$	$43\overline{)8950}$	$44\overline{)9817}$
6.	$22\overline{)20049}$	$24\overline{)18249}$	$25\overline{)24758}$
7.	$54\overline{)16701}$	$55\overline{)17441}$	$60\overline{)18001}$
8.	$67\overline{)27239}$	$79\overline{)49798}$	$81\overline{)57443}$
9.	$97\overline{)59080}$	$135\overline{)2160}$	$205\overline{)6560}$
10.	$182\overline{)8190}$	$807\overline{)8139}$	$112\overline{)8529}$
11.	$249\overline{)13450}$	$347\overline{)19533}$	$506\overline{)86637}$

Divide each number to the left of the line by each number to the right of the line. Check.

12.	6485	41
13.	7328	49
14.	8542	57
15.	9627	68
16.	12645	75
17.	18962	82
18.	22567	99
19.	30875	205
20.	38968	375
21.	39981	421

49. Exercise:

1. The 600 children of a school marched in a parade in groups of 24; how many groups were there?

2. George's mother asked him to tell how many hours they will require to make a trip of 240 miles in their automobile if they run 20 miles an hour. He told her the right answer; what was it?

3. The 21 girls in Mildred's room sold 1092 Red Cross seals; what was the average number sold by each girl?

4. Sam's father is a rural mail carrier; his route is 25 miles. How many trips must he make on this route to travel 1000 miles?

5. John's uncle buys and sells flour; he bought in one month 3600 pounds of flour in 12-pound sacks; how many sacks of flour did he buy that month?

6. The children in a school bought in one year 768 thrift stamps. How many thrift cards would these fill, each card having spaces for 16 stamps?

7. The Woolworth building in New York is 792 feet high. This is how many times as high as a schoolhouse 36 feet high?

8. Mr. Wilson shipped 1296 doz. eggs in 18 crates of equal size. How many dozen were there in each crate?

9. Corn weighs 56 lb. to the bushel. A farmer's crop weighed 8568 lb.; how many bushels had he?

10. Wheat weighs 60 lb. to the bushel. A farmer's crop weighed 6200 lb.; how many bushels had he, and how many pounds over?

50. Exercise:

1. Add (get the six answers in 8 minutes or less):

874	697	785	947	869	571
593	836	646	653	717	847
360	548	928	786	578	952
928	972	874	574	940	719
652	709	509	409	656	684
719	463	467	865	435	476
485	856	753	792	828	968
246	685	998	948	793	835
979	999	686	880	984	797

2. Subtract (get the eight answers in 5 minutes or less):

1015083799	138599094	172909159	149644097
251304589	73610189	93421630	64051436
174073189	10378345	116813118	102406732
92549775	7483071	43292635	65392891

3. Multiply (get the eight answers in 8 minutes or less):

7346	3628	5294	8573
37	26	48	95
8376	9258	4962	4957
84	73	59	62

4. Divide (get the answers at the rate of one in 2 minutes):

28)19348	39)20124	65)26455	74)30192
57)26733	92)35880	33)59760	46)44830

51. Exercise:

1. 45 drops of water make 1 teaspoonful, 2 teaspoonfuls make 1 dessertspoonful, 2 dessertspoonfuls make 1 tablespoonful. How many drops of water in a tablespoonful?

2. Test to see that these statements are true:

$9 \times 1 + 2 = 11$
$9 \times 12 + 3 = 111$
$9 \times 123 + 4 = 1111$
$9 \times 1234 + 5 = 11111$
$9 \times 12345 + 6 = 111111$
$9 \times 123456 + 7 = 1111111$
$9 \times 1234567 + 8 = 11111111$
$9 \times 12345678 + 9 = 111111111$

Multiply across; add down:

$$\begin{array}{lll}
3.\ 45 \times 285 = ? & 4.\ 67 \times 825 = ? & 5.\ 89 \times 261 = ? \\
45 \times 461 = ? & 67 \times 367 = ? & 89 \times 378 = ? \\
45 \times 973 = ? & 67 \times 891 = ? & 89 \times 684 = ? \\
\underline{45 \times 869 = ?} & \underline{67 \times 496 = ?} & \underline{89 \times 957 = ?} \\
45 \times \ ? \ = ? & 67 \times \ ? \ = ? & 89 \times \ ? \ = ?
\end{array}$$

Remark. Observe that examples 3, 4, and 5 provide a review of the tables of 4's, 5's, 6's, 7's, 8's, and 9's as far as 4 × 9, 5 × 9, etc., up to 9 × 9.

6. How much must a committee provide for the care of 40,000 homeless Serbian children for one year, if $72 will provide for each child for one year?

7. A man bought a lot for $750 and built on it a house that cost $4755. He sold house and lot for $6000; what was his profit?

8. A remnant of 5 yards of white goods was marked down from 50¢ to 33¢ a yard; what difference did this make in the price of the remnant?

52. Exercise:

1. Mary's report shows that in December her rank was fourth in a class of 25 pupils; how many of the class ranked higher than Mary? how many ranked lower?

2. James works in a store 2 hours each school day and 8 hours on Saturday; how much does he earn each week by this work if he is paid $0.25 an hour?

3. A man's delivery of milk one morning was 40 gal., 30 gal. in quart bottles and 10 gal. in pint bottles; how many bottles of milk did he deliver that morning?

4. A setting of 15 eggs is sold at the Clover Hill Farm for $4.00, or two settings, 30 eggs, for $7.50. How much is saved by buying two settings at one time instead of two settings at different times? When 30 eggs are sold for $7.50, how much is that apiece?

5. For a dress for Eleanor her mother bought:

4 yd. gingham	at $0.45 a yard
½ yd. white pique	at $0.50 a yard
1 doz. buttons,	$0.50
1 spool cotton,	$0.09

Find the cost of Eleanor's dress, the cost of making it being $1.50.

6. Ethel can buy a Mother Hubbard apron for $1.75. How much will she save if she buys 5 yards of gingham at 28¢ a yard, and makes the apron herself?

7. How much profit does a newsboy make on 100 copies of a daily paper printed in his home town, for which he pays $0.60 and which he sells for 1¢ each?

53. Exercise:

1. At the beginning of a trip a trolley car register showed that 6107 fares had been collected and at the end of the trip 6298 fares; how many were collected during the trip? The fares were 5-cent fares; how much money was collected?

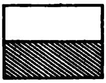
2. The following table shows the number of bushels of grain shipped from a certain depot during one week; copy and fill in the totals:

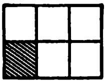
Grain	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Total
Wheat . .	506	621	453	786	399	375	
Corn . . .	250	783	575	493	296	492	
Oats	393	294	196	309	245	326	
Rye . . .	56	93	87	55	47	79	
Total . .							

3. An old store book shows that on Sept. 3d, 1897, Mrs. Robinson sold at the general store, near her home, 10 doz. eggs at 14¢ a dozen and 8 lb. of butter at 12¢ a pound. She bought 2 brooms at 20 cents each, 20 lb. sugar at 5¢ a pound, 1 lb. coffee at 20¢ a pound, and 2 lb. crackers at 5¢ a pound. The produce which she sold amounted to how much more than the goods which she bought? At the price which these articles are bringing to-day in the place where you live, the produce sold by Mrs. Robinson would bring how much more than the cost of the goods which she bought?

54. You have learned how to read and write many such numbers as $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{3}{8}$. (See pages 152–156, which you should now review.) These numbers are called **fractions**. From now on, both in your school work and in your other activities, you will need more and more to use fractions; as when you buy $\frac{1}{2}$ of a yard of ribbon, or when you work $\frac{3}{4}$ of an hour, or measure $\frac{3}{8}$ of an inch.

55. Exercise:


A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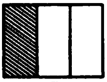
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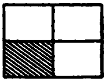
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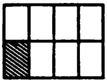
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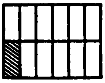
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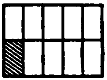
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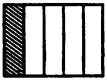

H

The rectangles on this page are named: *A*, *B*, *C*, *D*, *E*, *F*, *G*, and *H*.

1. Which is divided into *halves?*
2. Which is divided into *eighths?*
3. Which is divided into *thirds?*
4. Which is divided into *sixths?*
5. Which is divided into *fifths?*
6. Which is divided into *fourths?*
7. Which is divided into *tenths?*
8. Which is divided into *twelfths?*
9. One of the eight equal parts of *E* is written $\frac{1}{8}$. Write and read one of the 5 equal parts of *H*; one of the 10 equal parts of *G*.
10. Two of the 5 equal parts of *H* are written $\frac{2}{5}$. Write and read two of the equal parts of *C*; three of the equal parts of *D*; five of the equal parts of *F*.
11. Write and read thirty different fractions.
12. *A* shows that 1 equals $\frac{2}{2}$; what does each of the other rectangles show that 1 equals?

Halves, Fourths, Eighths, and Sixteenths

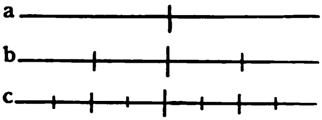
56. Exercise:

1. Which line shows that $\frac{1}{2}=\frac{2}{4}$?

2. Which shows that $\frac{1}{4}=\frac{2}{8}$?

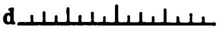
3. Which shows that $\frac{3}{4}=\frac{6}{8}$?

4. Which shows that $\frac{1}{2}=\frac{4}{8}$?



5. Name a fraction that may be used for $\frac{6}{8}$; for $\frac{2}{8}$; for $\frac{2}{4}$; for $\frac{4}{8}$. Look at the lines if you need to.

6. Line *d* is 1 inch long; into how many equal parts is *d* divided?



7. What is each of the equal parts of *d* called? What are two of them called? three of them? four of them?

8. Take a strip of paper and a sharp-pointed pencil. Lay the edge of the paper along line *d* and write on the paper two marks $\frac{1}{16}$ of an inch apart; then two marks $\frac{2}{16}$, or $\frac{1}{8}$, of an inch apart; two marks $\frac{1}{4}$ of an inch apart; then two marks $\frac{1}{2}$ of an inch apart.

9. Look at *d* and tell how many sixteenths there are in $\frac{1}{2}$; in $\frac{1}{4}$; in $\frac{1}{8}$; in $\frac{3}{4}$; in $\frac{3}{8}$.

10. Look at the lines and name five fractions, each more than $\frac{1}{2}$; then five fractions, each less than $\frac{1}{2}$.

Read the following sets of fractions, supplying the right number where the ? is. Look at lines *a*, *b*, *c*, *d*.

11. $\frac{2}{4}=\frac{?}{2}$ $\frac{2}{8}=\frac{?}{4}$ $\frac{10}{16}=\frac{?}{8}$ $\frac{4}{8}=\frac{?}{2}$ $\frac{5}{8}=\frac{?}{16}$

12. $\frac{6}{8}=\frac{?}{4}$ $\frac{12}{16}=\frac{?}{4}$ $\frac{14}{16}=\frac{?}{8}$ $\frac{4}{16}=\frac{?}{4}$ $\frac{2}{16}=\frac{?}{8}$

13. $\frac{1}{4}=\frac{?}{8}$ $\frac{3}{4}=\frac{?}{16}$ $\frac{3}{4}=\frac{?}{8}$ $\frac{3}{8}=\frac{?}{16}$ $\frac{7}{8}=\frac{?}{16}$

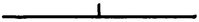
14. $\frac{1}{2}=\frac{?}{4}$ $\frac{1}{8}=\frac{?}{16}$ $\frac{1}{2}=\frac{?}{8}$ $\frac{1}{4}=\frac{?}{16}$ $\frac{1}{2}=\frac{?}{16}$

Adding Easy Fractions

57. Exercise:

1. Take your ruler and measure *a*; how long is it?

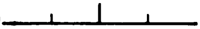
2. How long is each part of *a*?

a


3. If a line is $\frac{1}{2}$ of an inch long and you add $\frac{1}{2}$ of an inch to it, how long is it then?

4. Write $\frac{1}{2}$ in. + $\frac{1}{2}$ in. = $\frac{2}{2}$ in. = ? in. (Think 1 for $\frac{2}{2}$.)

5. How long do you think line *b* is? Test. How long do you think each part of *b* is? Test.

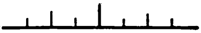
b


6. $\frac{1}{4}$ in. + $\frac{1}{4}$ in. = ? Give the sum two names.

7. $\frac{3}{4}$ in. + $\frac{1}{4}$ in. = ? Give the sum two names.

8. How long do you think line *c* is? Test.

9. How long do you think each of the parts of *c* is? Test.

c


10. What two names can you give to 2 of the parts of *c*? 4 of them? 6 of them?

11. Add $\frac{1}{8}$ in. and $\frac{1}{8}$ in.; give the sum two names.

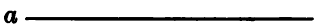
12. Add $\frac{1}{8}$ in. and $\frac{3}{8}$ in. Give the sum two names.

Say the sums at sight. Say 1 for $\frac{2}{2}$, or $\frac{4}{4}$, or $\frac{8}{8}$; say $\frac{1}{2}$ for $\frac{2}{4}$, or $\frac{4}{8}$; say $\frac{1}{4}$ for $\frac{2}{8}$; say $\frac{3}{4}$ for $\frac{6}{8}$.

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
13.	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{4}{8}$	$\frac{4}{8}$	$\frac{1}{8}$
	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{2}{8}$	$\frac{4}{8}$	$\frac{7}{8}$
14.	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{1}{8}$
	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{2}{8}$	$\frac{2}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{2}{8}$
	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{5}{8}$

58. Exercise :

1. Do you think line *a* is an inch long, or less than an inch, or more than an inch? Test.



2. If line *a* is more than an inch long, how much more?

3. 1 *in. and* $\frac{1}{2}$ *in. more is written* $1\frac{1}{2}$ *in.*

4. Write in a short way 1 in. and $\frac{1}{4}$ in. more; 1 in. and $\frac{3}{4}$ in. more; 1 in. and $\frac{5}{8}$ in. more; 2 in. and $\frac{1}{2}$ in. more; 2 in. and $\frac{3}{8}$ in. more; 3 in. and $\frac{3}{4}$ in. more.

Numbers like $1\frac{1}{2}$, $1\frac{3}{4}$, $2\frac{1}{4}$, $2\frac{1}{2}$, and $3\frac{3}{4}$ are called **mixed numbers.**

Numbers like 2, 3, 4, 5, 10, and 25 are called **whole numbers** or **integers.**

5. Write 20 different mixed numbers and read them.

6. Draw a line $2\frac{1}{2}$ in. long; divide it into $\frac{1}{2}$-in. lines. Tell how many $\frac{1}{2}$-in. lines it makes. Write $2\frac{1}{2}$ in. $= \frac{5}{2}$ in.

7. Draw a line $2\frac{1}{4}$ in. long; divide it into $\frac{1}{4}$-in. lines. Tell how many $\frac{1}{4}$-in. lines it makes. Write $2\frac{1}{4}$ in. $= \frac{9}{4}$ in.

8. How many $\frac{1}{2}$-ft. lines are there in a $3\frac{1}{2}$-ft. line?

9. Read, supplying the right number where the ? is:
$1\frac{1}{2}$ in. $= \frac{?}{2}$ in. $2\frac{1}{2}$ lb. $= \frac{?}{2}$ lb. $1\frac{1}{4}$ pk. $= \frac{?}{4}$ pk. $2\frac{1}{4}$ gal. $= \frac{?}{4}$ gal.

10. 5 half-pound prints of butter are how many whole pounds and how much more? Write $\frac{5}{2}$ lb. $= 2\frac{1}{2}$ lb.

11. Read these, saying the fraction which should be placed after each of the whole numbers:

$\frac{3}{2}$ gal. $= 1\frac{?}{?}$ gal. $\frac{5}{4}$ in. $= 1\frac{?}{?}$ in. $\frac{5}{2}$ yd. $= 2\frac{?}{?}$ yd. $\frac{7}{2}$ lb. $= 3\frac{?}{?}$ lb.
$\frac{7}{4}$ yd. $= 1\frac{?}{?}$ yd. $\frac{9}{4}$ hr. $= 2\frac{?}{?}$ hr. $\frac{9}{2}$ bu. $= 4\frac{?}{?}$ bu. $\frac{11}{8}$ in. $= 1\frac{?}{?}$ in.

59. Exercise:

1. James earns money after school. One day he earned $\frac{1}{4}$ dollar and another day $\frac{1}{2}$ dollar. How much did he earn in the two days?

(*Think* $\frac{1}{2}$ dollar $= \frac{2}{4}$ dollar.)

2. Tom had $\frac{3}{4}$ dollar in his bank and then put $\frac{1}{2}$ dollar more into it; how much had he then in his bank?

(*Think* $\frac{2}{4}$ for $\frac{1}{2}$, and $1\frac{1}{4}$ for $\frac{5}{4}$.)

In adding halves and fourths, change halves to fourths; in adding halves and eighths, change halves to eighths; in adding fourths and eighths, change fourths to eighths.

Add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*
3.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{2}$

4. May read a story book through in three evenings. The first evening she read $\frac{1}{4}$ hr., the second $\frac{1}{2}$ hr., and the third $\frac{1}{4}$ hr. She read the book in — hr. Say the right number where the line is.

5. Add:

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8}$
$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{2}$

6. How wide must a strip of paper be that is just wide enough to make two strips each $\frac{1}{2}$ in. wide and two strips each $\frac{1}{4}$ in. wide? Test your answer by measuring.

60. Exercise:

1. Beatrice had three pieces of ribbon. One piece contained $1\frac{1}{2}$ yd., another $1\frac{1}{2}$ yd., and the third $\frac{1}{2}$ yd. She asked her sister Edna how many yards the three pieces together contained.

This is the way Edna found her answer:

YARDS
$1\frac{1}{2}$
$1\frac{1}{2}$
$\frac{1}{2}$
$3\frac{1}{2}$

She thought $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=\frac{3}{2}$.

For $\frac{3}{2}$ she thought $1\frac{1}{2}$ and wrote $\frac{1}{2}$ under the *halves*.

Then she thought $1+1+1=3$, and wrote 3 under the *ones*. Is her answer right?

2. Write the sums. Think what to do when the sum of the fractions is 1 or more:

a	*b*	*c*	*d*	*e*	*f*	*g*
$1\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{8}$
2	$1\frac{1}{2}$	$1\frac{3}{4}$	3	$2\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{7}{8}$
2	3	2	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{8}$

3. Helen keeps a record of the number of hours she practices her music lesson each day. Here is her record for four weeks. How many hours did she practice the first week? the second week? the third week? the fourth week?

	1st week	*2d week*	*3d week*	*4th week*
Mon.	$1\frac{1}{4}$	$1\frac{1}{2}$	1	1
Tues.	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$
Wed.	1	$\frac{1}{2}$	1	$\frac{3}{4}$
Thur.	$1\frac{1}{4}$	1	$1\frac{3}{4}$	$1\frac{1}{4}$
Fri.	1	$1\frac{1}{2}$	$1\frac{1}{4}$	1
Sat.	2	2	2	2

61. Exercise:

1. Beatrice bought 3 pieces of lace. One piece contained 1 yd., another $1\frac{1}{2}$ yd., and the third $1\frac{3}{4}$ yd. She asked Edna how many yards the three pieces together contained.

Here is the way Edna found her answer.

YARDS
1
$1\frac{1}{2}$
$1\frac{3}{4}$
$4\frac{1}{4}$

She thought $\frac{1}{2} = \frac{2}{4}$; and also that $\frac{2}{4} + \frac{3}{4} = \frac{5}{4}$. For $\frac{5}{4}$ she thought $1\frac{1}{4}$ and wrote $\frac{1}{4}$ under the *fractions*. Then she thought $1 + 1 + 1 + 1 = 4$ and wrote 4 under the *ones*. Is Edna's answer correct?

2. Write the sums. Think what to do when the sum of the fractions is 1 or more.

a	*b*	*c*	*d*	*e*	*f*	*g*
$2\frac{1}{2}$	$2\frac{5}{8}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$3\frac{1}{8}$
1	1	$2\frac{7}{8}$	$3\frac{1}{4}$	$4\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{3}{8}$
$1\frac{3}{4}$	$2\frac{1}{2}$	3	$2\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$

3. John delivers papers each morning. Here is a record of the number of hours he worked for four weeks:

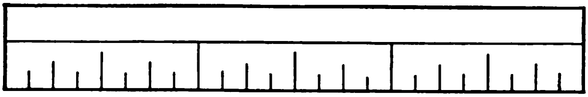
	Mon.	*Tues.*	*Wed.*	*Thur.*	*Fri.*	*Sat.*
1st week	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	1	$1\frac{1}{2}$
2d week	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	1	$1\frac{1}{2}$
3d week	$1\frac{1}{4}$	$1\frac{3}{4}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{4}$
4th week	$1\frac{1}{2}$	1	$1\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{3}{4}$

How many hours did he spend delivering papers the first week? the second week? the third? the fourth?

How many hours did he work in making his four deliveries for Monday? for each of the other days?

Subtraction

62. Exercise:



1. How long is this rule? What is the name of each of the smallest divisions shown on it?

2. What two names may you give to 2 of the smallest divisions of this rule? to 6 of them? to 8 of them?

3. A line $\frac{3}{8}$ in. long is how much longer than a line $\frac{1}{8}$ in. long? $\frac{3}{8}$ in. $-$ $\frac{1}{8}$ in. $= \frac{?}{8} = \frac{?}{4}$.

4. A line $\frac{7}{8}$ in. long is how much longer than a line $\frac{3}{8}$ in. long? $\frac{7}{8}$ in. $-$ $\frac{3}{8}$ in. $= \frac{?}{8} = \frac{?}{4} = \frac{?}{2}$.

5. Find the following lengths on the rule. Name each that is less than 1 in. and tell how much less; then each that is greater than 1 in. and tell how much greater.

$\frac{1}{4}$ in. $\frac{1}{2}$ in. $1\frac{1}{2}$ in. $\frac{3}{8}$ in. $1\frac{1}{4}$ in. $\frac{1}{8}$ in.
$\frac{3}{4}$ in. $1\frac{3}{4}$ in. $2\frac{1}{2}$ in. $\frac{7}{8}$ in. $1\frac{1}{8}$ in. $\frac{5}{8}$ in.

Subtract:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
6.	$\frac{3}{4}$ $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	$\frac{7}{8}$ $\frac{5}{8}$	$\frac{5}{8}$ $\frac{1}{8}$	$\frac{1}{2}$ $\frac{1}{8}$		
7.	$1\frac{1}{2}$ 1	$2\frac{1}{4}$ 1	$3\frac{1}{2}$ 2	$3\frac{3}{4}$ 2	$4\frac{1}{8}$ 3	$4\frac{3}{8}$ $2\frac{1}{8}$		
8.	$\frac{1}{2}$ $\frac{1}{4}$	$\frac{3}{8}$ $\frac{1}{4}$	$\frac{1}{2}$ $\frac{3}{8}$	$\frac{1}{4}$ $\frac{1}{8}$	$\frac{5}{8}$ $\frac{1}{4}$	$\frac{7}{8}$ $\frac{1}{4}$	$\frac{3}{4}$ $\frac{5}{8}$	$\frac{3}{4}$ $\frac{3}{8}$

Think $\frac{4}{8}$ for $\frac{1}{2}$.

Subtract the fractions, then the whole number.

63. Exercise:

1. Howard's sister bought a remnant of $5\frac{1}{4}$ yards of gingham and used $3\frac{3}{4}$ yards of it. She asked him how much of the remnant she then had left. He gave as his answer *$1\frac{1}{2}$ yards*, and told her how he found it. He said:

YARDS

$$\begin{array}{r} 5\frac{1}{4} \\ 3\frac{3}{4} \\ \hline 1\frac{1}{2} \end{array}$$

I knew that $\frac{3}{4}$ is more than $\frac{1}{4}$ and that I cannot take $\frac{3}{4}$ from $\frac{1}{4}$; so I thought of 1 of the 5 as $\frac{4}{4}$ and thought of $5\frac{1}{4}$ as $4\frac{5}{4}$. Then I knew that $\frac{5}{4}$ less $\frac{3}{4}$ is $\frac{2}{4}$, or $\frac{1}{2}$, so I wrote $\frac{1}{2}$ under the *fourths;* also, that 4 less 3 is 1; so I wrote 1 under the *ones.* Is Howard's answer correct?

2. How long is the rope left after you have cut $\frac{1}{2}$ yd. of it from a piece 1 yd. long? from a piece 3 yd. long?

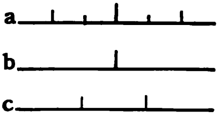
Subtract:

	a	*b*	*c*	*d*	*e*	*f*	
3.	$5\frac{1}{2}$ $2\frac{1}{2}$	$3\frac{3}{4}$ $1\frac{3}{4}$	$3\frac{3}{4}$ $1\frac{1}{4}$	$5\frac{5}{8}$ $2\frac{3}{8}$	$4\frac{7}{8}$ $2\frac{1}{8}$	$4\frac{3}{4}$ $2\frac{1}{2}$	*Change $\frac{1}{2}$ to $\frac{2}{4}$.*
4.	$5\frac{1}{2}$ $2\frac{1}{4}$	$7\frac{1}{2}$ $3\frac{1}{8}$	$5\frac{3}{4}$ $2\frac{1}{2}$	$8\frac{1}{4}$ $2\frac{1}{8}$	$5\frac{3}{4}$ $3\frac{1}{8}$	$7\frac{3}{4}$ $3\frac{3}{8}$	*Change $\frac{3}{4}$ to $\frac{6}{8}$.*
5.	$9\frac{3}{8}$ $2\frac{1}{4}$	$8\frac{1}{2}$ $3\frac{3}{8}$	$9\frac{7}{8}$ $2\frac{1}{4}$	$9\frac{7}{8}$ $3\frac{3}{4}$	$9\frac{3}{4}$ $3\frac{5}{8}$	7 $2\frac{3}{4}$	*Change 1 of the 7 to $\frac{4}{4}$.*
6.	5 $2\frac{1}{2}$	7 $2\frac{1}{2}$	9 $3\frac{1}{4}$	8 $3\frac{3}{8}$	6 $4\frac{7}{8}$	$7\frac{1}{2}$ $5\frac{3}{4}$	*Think what to do when the fraction to be subtracted is the larger. See example 1.*
7.	$5\frac{1}{4}$ $2\frac{3}{4}$	$7\frac{1}{4}$ $3\frac{1}{2}$	$8\frac{1}{2}$ $4\frac{3}{4}$	$6\frac{1}{4}$ $3\frac{5}{8}$	$7\frac{1}{2}$ $3\frac{7}{8}$	$7\frac{3}{8}$ $3\frac{3}{4}$	

8. When Elsie's baby brother was 2 months old he weighed $10\frac{3}{4}$ lb.; when he was 3 months old he weighed $12\frac{1}{4}$ lb. How much did he gain in weight in the month?

Halves, Thirds, and Sixths

64. Exercise:



1. Which line shows that $\frac{1}{2}=\frac{3}{6}$?

2. Which shows that $\frac{1}{3}=\frac{2}{6}$?

3. Which shows that $\frac{2}{3}=\frac{4}{6}$?

4. What may we write instead of $\frac{2}{2}$? instead of $\frac{3}{3}$? instead of $\frac{6}{6}$?

5. Read, saying the right number where the ? is:

$\frac{1}{2}=\frac{?}{6}$; $\frac{1}{3}=\frac{?}{6}$; $\frac{3}{6}=\frac{?}{2}$; $\frac{2}{3}=\frac{?}{6}$; $\frac{4}{6}=\frac{?}{3}$.

6. Draw on the blackboard a line 1 yd. long; then make the line $\frac{1}{3}$ of a yard longer.

7. Write in a short way 1 yard and $\frac{1}{3}$ yd. more; 1 yd. and $\frac{2}{3}$ yd. more; 2 yd. and $\frac{1}{3}$ yd. more.

8. Read, saying the right number where the ? is:

$1\frac{1}{3}$ ft. $=\frac{?}{3}$ ft. $2\frac{2}{3}$ ft. $=\frac{?}{3}$ ft. $1\frac{2}{3}$ yd. $=\frac{?}{3}$ yd. $3\frac{2}{3}$ hr. $=\frac{?}{3}$ hr.
$3\frac{1}{3}$ doz. $=\frac{?}{3}$ doz. $1\frac{1}{6}$ ft. $=\frac{?}{6}$ ft. $1\frac{5}{6}$ pies $=\frac{?}{6}$ pies $2\frac{1}{6}$ da. $=\frac{?}{6}$ da.

9. What may we say instead of:

$\frac{2}{6}$? $\frac{3}{6}$? $\frac{4}{6}$? $\frac{4}{3}$? $\frac{5}{3}$? $\frac{6}{3}$? $\frac{7}{3}$? $\frac{8}{3}$? $\frac{9}{3}$? $\frac{10}{3}$?

Add; remember what to do when the sum is 1 or more:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
10.	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{3}{6}$
	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{2}{6}$	$\frac{1}{6}$	$\frac{3}{6}$
11.	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{3}{3}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{2}{6}$
	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{1}{6}$
	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{2}{6}$	$\frac{3}{6}$

65. Exercise:

Add:

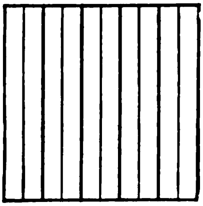
	a	b	c	d	e	f	g	h
1.	$1\frac{1}{3}$	$\frac{2}{3}$	$1\frac{1}{3}$	$1\frac{1}{3}$	$2\frac{2}{3}$	$3\frac{1}{3}$	$1\frac{2}{3}$	$3\frac{1}{3}$
	$\frac{2}{3}$	$2\frac{2}{3}$	$2\frac{1}{3}$	$1\frac{1}{3}$	$1\frac{1}{3}$	$1\frac{1}{3}$	$2\frac{2}{3}$	$2\frac{2}{3}$
2.	$\frac{1}{3}$	$2\frac{1}{3}$	$\frac{2}{3}$	$2\frac{2}{3}$	$2\frac{1}{3}$	$3\frac{1}{3}$	$\frac{2}{3}$	$3\frac{1}{3}$
	$3\frac{1}{3}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{1}{3}$	$2\frac{2}{3}$	$1\frac{2}{3}$	$3\frac{1}{3}$
	$1\frac{1}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$1\frac{1}{3}$	$1\frac{1}{3}$	$1\frac{2}{3}$	$3\frac{2}{3}$	$3\frac{1}{3}$
3.	$1\frac{1}{6}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{3}$	*Remember that $\frac{1}{3}=\frac{2}{6}$. What can you write in the answer for $\frac{3}{6}$?*	
	$\frac{1}{6}$	$\frac{3}{6}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{2}{6}$	$\frac{1}{6}$		
	$1\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{5}{6}$	$\frac{1}{6}$		
4.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{2}$	*Change $\frac{1}{2}$ and $\frac{1}{3}$ to 6ths.*		$\frac{1}{2}$
	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{3}$			$\frac{1}{3}$
	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{3}$			$\frac{1}{6}$
5.	$2\frac{1}{2}$	$3\frac{1}{3}$	$4\frac{1}{2}$	$3\frac{2}{3}$	$4\frac{1}{2}$	$3\frac{1}{3}$	$4\frac{1}{2}$	$3\frac{1}{6}$
	2	$2\frac{1}{6}$	$3\frac{1}{3}$	$1\frac{1}{6}$	$1\frac{2}{3}$	$2\frac{2}{3}$	$5\frac{1}{2}$	$2\frac{1}{2}$
	$3\frac{1}{6}$	3	2	3	4	$1\frac{1}{2}$	$3\frac{1}{3}$	$3\frac{1}{3}$

Subtract:

	a	b	c	d	e	f	g	
6.	$\frac{2}{3}$	$\frac{3}{3}$	$3\frac{2}{3}$	$\frac{5}{6}$	$4\frac{5}{6}$	$\frac{5}{6}$	$\frac{1}{2}$	*Change $\frac{1}{2}$ to 6ths.*
	$\frac{1}{3}$	$\frac{1}{3}$	$1\frac{1}{3}$	$\frac{1}{6}$	$3\frac{1}{6}$	$\frac{4}{6}$	$\frac{1}{6}$	
7.	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{1}{2}$	*Change $\frac{1}{2}$ and $\frac{1}{3}$ to 6ths.*		$\frac{2}{3}$	4	*Change 1 of the 4 to $\frac{3}{3}$.*
	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$			$\frac{1}{2}$	$1\frac{1}{3}$	
8.	3	4	$4\frac{2}{3}$	$4\frac{5}{6}$	$3\frac{1}{2}$	*Remember how example 1, page 213, was worked.*		$5\frac{1}{2}$
	$2\frac{1}{3}$	$2\frac{2}{3}$	$1\frac{1}{2}$	$2\frac{2}{3}$	$2\frac{2}{3}$			$1\frac{5}{6}$

Halves, Fifths, and Tenths

66. Exercise:



1. What is the name of this figure? How long do you think each side is? Test.

2. This square inch is divided into how many equal parts?

3. What is the name of *one* of the equal parts of this square? of 2 of them? 3 of them? 4 of them? 5 of them? 6 of them? 8 of them? 10 of them?

4. The heavy lines divide the square into how many equal parts?

5. Read $\frac{1}{5}$; $\frac{2}{5}$; $\frac{3}{5}$; $\frac{4}{5}$; $\frac{5}{5}$.

6. Look at the square and tell what you may say instead of $\frac{1}{5}$; instead of $\frac{2}{5}$; instead of $\frac{3}{5}$; instead of $\frac{5}{5}$.

7. Read, saying the right number where each ? is:

$\frac{1}{2}=\frac{?}{10}$ $\frac{1}{5}=\frac{?}{10}$ $\frac{4}{10}=\frac{?}{5}$ $\frac{4}{5}=\frac{?}{10}$ $\frac{2}{10}=\frac{?}{5}$
$\frac{5}{10}=\frac{?}{2}$ $\frac{3}{5}=\frac{?}{10}$ $\frac{8}{10}=\frac{?}{5}$ $\frac{2}{5}=\frac{?}{10}$ $\frac{6}{10}=\frac{?}{5}$

8. $\frac{1}{5}+\frac{1}{5}=?$ $\frac{2}{5}+\frac{1}{5}=?$ $\frac{2}{5}+\frac{2}{5}=?$ $\frac{3}{5}+\frac{1}{5}=?$

9. $\frac{1}{5}+\frac{4}{5}=?$ $\frac{2}{5}+\frac{3}{5}=?$ (*What may you say instead of* $\frac{5}{5}$*?*)

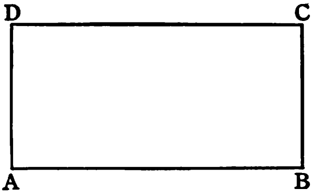
1 cent = $\frac{1}{5}$ nickel 1 cent = $\frac{1}{10}$ dime 1 dime = $\frac{1}{10}$ dollar

10. Read, supplying the missing numbers:

2 cents = $\frac{?}{5}$ nickel 3 cents = $\frac{?}{5}$ nickel 4 cents = $\frac{?}{5}$ nickel
2 cents = $\frac{?}{10}$ dime 3 cents = $\frac{?}{10}$ dime 5 cents = $\frac{?}{10}$ dime
2 dimes = $\frac{?}{10}$ dollar 4 dimes = $\frac{?}{10}$ dollar 5 dimes = $\frac{?}{10}$ dollar

11. Count this way: $\frac{1}{10}$ dime = 1 cent; $\frac{2}{10}$ dime = 2 cents; and so on to $\frac{10}{10}$ dimes = — cents.

67. Exercise:



1. What is the shape of this figure?

2. Measure AB and the other *sides* of the rectangle. Write in a column their lengths, and find the sum.

3. Which lines are the same length?

4. AB is how much longer than AD?

Add, stating the sums at sight when you can do so:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
5.	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{2}{5}$	$1\frac{1}{10}$	$1\frac{3}{10}$	$\frac{1}{2}$
	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{5}$	$\frac{2}{10}$	$2\frac{4}{10}$	$\frac{1}{10}$

Change $\frac{1}{2}$ to tenths. Write what for $\frac{5}{10}$?

	a	*b*	*c*	*d*
6.	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{2}$
	$\frac{3}{10}$	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{1}{5}$

Change $\frac{1}{2}$ and $\frac{1}{5}$ to tenths.

	a	*b*	*c*	*d*
7.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{5}$
	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{10}$

8. Subtract, stating the difference at sight when you can:

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
$\frac{4}{5}$	$1\frac{1}{5}$	$2\frac{3}{5}$	$1\frac{1}{5}$	$1\frac{2}{5}$	$4\frac{1}{5}$	$1\frac{1}{10}$	$\frac{1}{2}$
$\frac{1}{5}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{9}{10}$	$\frac{1}{5}$

Remember what you did in example 1, page 213.

Change $\frac{1}{2}$ and $\frac{1}{5}$ to tenths.

	a	*b*	*c*	*d*
9.	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{5}$
	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{2}{5}$	$\frac{1}{2}$

	a	*b*	*c*	*d*
10.	$1\frac{1}{10}$	$1\frac{2}{5}$	$1\frac{3}{10}$	$1\frac{1}{10}$
	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{5}$

11. Which of these fractions is the least? the greatest?

$$\frac{1}{2} \quad \frac{1}{5} \quad \frac{1}{10} \quad \frac{2}{5} \quad \frac{3}{10} \quad \frac{3}{5} \quad \frac{9}{10} \quad \frac{4}{5}$$

What must be added to each to make 1? to make 2?

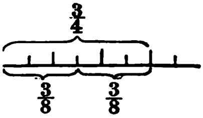
68. Exercise:

This table shows about what the height and weight of children are at different ages from birth to 10 years of age. The 1½ *in.* in the fourth column shows the child's usual gain in height between birth and the age of 1 mo., the 1¼ *lb.* in the fifth column shows its gain in weight in the same time. Copy this table and write in the last two columns the gains in height and weight from 1 mo. to 2 mo.; from 2 mo. to 3 mo.; and so on.

AGE	HEIGHT	WEIGHT	GAIN IN HEIGHT	GAIN IN WEIGHT
Birth	19 inches	7½ pounds		
1 month	20½ "	8¾ "	1½ inches	1¼ pounds
2 months	21 "	10¾ "		
3 "	22 "	12¼ "		
4 "	23 "	13¾ "		
5 "	23½ "	15 "		
6 "	24 "	16¼ "		
7 "	24½ "	17¼ "		
8 "	25 "	18¼ "		
9 "	25½ "	18¾ "		
10 "	26 "	19¾ "		
11 "	26½ "	20½ "		
1 year	27 "	21½ "		
2 years	31 "	27 "		
3 "	35 "	32 "		
4 "	37½ "	36 "		
5 "	40 "	40 "		
6 "	43 "	44 "		
7 "	45 "	48 "		
8 "	47 "	53 "		
9 "	49 "	58 "		
10 "	51 "	64 "		

Multiplication

69. Exercise:



1. How long is each of the equal parts of this line?

2. How long are 3 of the equal parts of this line?

3. The drawing shows that $2 \times \frac{3}{8}$ in. $= \frac{6}{8}$ in., or $\frac{3}{4}$ in.

4. Make drawings to show that:

$2 \times \frac{1}{2}$ in. $= \frac{2}{2}$ in., or 1 in.; $2 \times \frac{3}{4}$ in. $= \frac{6}{4}$ in., or $1\frac{1}{2}$ in.
$2 \times \frac{5}{8}$ in. $= \frac{10}{8}$ in., or $1\frac{1}{4}$ in.; $2 \times \frac{7}{8}$ in. $= \frac{14}{8}$ in., or $1\frac{3}{4}$ in.

Say the right answer at sight:

5. $2 \times \frac{1}{2}$ $\quad 2 \times \frac{2}{3}$ $\quad 2 \times \frac{1}{8}$ $\quad 2 \times \frac{2}{5}$ $\quad 4 \times \frac{3}{8}$ $\quad 8 \times \frac{1}{8}$

6. $3 \times \frac{1}{3}$ $\quad 2 \times \frac{3}{4}$ $\quad 2 \times \frac{3}{8}$ $\quad 2 \times \frac{4}{5}$ $\quad 4 \times \frac{5}{8}$ $\quad 8 \times \frac{1}{4}$

7. $2 \times 2\frac{1}{3}$. (*Multiply both the fraction and the whole number.*)

8. $2 \times 1\frac{1}{2}$ $\quad 3 \times 3\frac{1}{3}$ $\quad 2 \times 2\frac{1}{6}$ $\quad 4 \times 2\frac{1}{2}$ $\quad 5 \times 3\frac{3}{5}$ $\quad 8 \times 2\frac{1}{4}$

9. Multiply $66\frac{2}{3}$ by 9.

This shows how to find the answer: *Write only this:*

$$\begin{array}{lr} & 66\frac{2}{3} \\ & \underline{9} \\ 9 \times 66 = & 594 \\ 9 \times \frac{2}{3} = & \underline{6} \\ 9 \times 66\frac{2}{3} = & 600 \end{array} \qquad \textit{Is the answer correct?} \qquad \begin{array}{r} 66\frac{2}{3} \\ \underline{9} \\ 594 \\ \underline{6} \\ 600 \end{array}$$

Copy and multiply:

$$\begin{array}{llllll} 10.\ \begin{array}{r} 16\frac{2}{3} \\ \underline{6} \end{array} & 11.\ \begin{array}{r} 33\frac{1}{3} \\ \underline{3} \end{array} & 12.\ \begin{array}{r} 12\frac{1}{2} \\ \underline{8} \end{array} & 13.\ \begin{array}{r} 37\frac{1}{2} \\ \underline{8} \end{array} & 14.\ \begin{array}{r} 62\frac{1}{2} \\ \underline{4} \end{array} & 15.\ \begin{array}{r} 87\frac{1}{2} \\ \underline{8} \end{array} \end{array}$$

$$\begin{array}{llllll} 16.\ \begin{array}{r} 66\frac{2}{3} \\ \underline{3} \end{array} & 17.\ \begin{array}{r} 18\frac{3}{4} \\ \underline{4} \end{array} & 18.\ \begin{array}{r} 62\frac{1}{2} \\ \underline{8} \end{array} & 19.\ \begin{array}{r} 33\frac{1}{3} \\ \underline{6} \end{array} & 20.\ \begin{array}{r} 18\frac{3}{4} \\ \underline{8} \end{array} & 21.\ \begin{array}{r} 66\frac{2}{3} \\ \underline{6} \end{array} \end{array}$$

Finding Parts of a Number

70. Exercise:

Read examples 1–6, supplying the missing numbers.

1. $\frac{1}{3}$ yd. = 1 ft., $\frac{2}{3}$ yd. = — ft., $\frac{3}{3}$ yd. = — ft.
2. $\frac{1}{4}$ gal. = 1 qt., $\frac{3}{4}$ gal. = — qt., $\frac{4}{4}$ gal. = — qt.
3. $\frac{1}{8}$ pk. = 1 qt., $\frac{3}{8}$ pk. = — qt., $\frac{5}{8}$ pk. = — qt.
4. $\frac{1}{4}$ bu. = 1 pk., $\frac{3}{4}$ bu. = — pk.
5. $\frac{1}{12}$ ft. = 1 in., $\frac{5}{12}$ ft. = — in., $\frac{7}{12}$ ft. = — in.
6. $\frac{1}{5}$ of 10 = 2, $\frac{2}{5}$ of 10 = —, $\frac{3}{5}$ of 10 = —, $\frac{5}{5}$ of 10 = —.
7. What is $\frac{1}{5}$ of 20? $\frac{2}{5}$ of 20? $\frac{3}{5}$ of 20? $\frac{4}{5}$ of 20?

State what is:

8. $\frac{1}{3}$, then $\frac{2}{3}$ of:
6, 9, 12,
15, 18, 21.

9. $\frac{1}{4}$, then $\frac{3}{4}$ of:
8, 12, 16,
20, 24, 28.

10. $\frac{1}{5}$, then $\frac{3}{5}$ of:
10, 15, 20, 25,
30, 35, 40, 50.

11. How many oranges are $\frac{1}{4}$ doz. oranges? $\frac{3}{4}$ doz.?

12. James is 12 years old and Frank is $\frac{3}{4}$ as old; how old is Frank?

13. Find the cost of $\frac{3}{4}$ lb. biscuit at 24¢ a pound.

14. Find the cost of $\frac{3}{4}$ lb. dried beef at 60¢ a pound.

15. If 5 loaves of bread cost 50¢, what did 1 loaf cost? What did 3 loaves cost? 4 loaves?

16. 1 qt. = $\frac{1}{4}$ gal., 3 qt. = — gal., 4 qt. = — gal.

17. 1 qt. = $\frac{1}{8}$ pk., 2 qt. = — pk., 5 qt. = — pk.

18. 1 = $\frac{1}{5}$ of 5, 2 = $\frac{2}{5}$ of 5, 3 = — of 5, 4 = — of 5.

19. Show by the use of 5 pennies that your answers to example 18 are correct.

Multiplication

71. Multiply 24 by $8\frac{2}{3}$.

This shows how to find the answer:

$$\begin{array}{rr} & 24 \\ & \underline{8\frac{2}{3}} \\ 8 \times 24 = & 192 \\ \frac{2}{3} \text{ of } 24 = & \underline{16} \\ 8\frac{2}{3} \times 24 = & 208 \end{array}$$

Write only this:

$$\begin{array}{r} 24 \\ \underline{8\frac{2}{3}} \\ 192 \\ \underline{16} \\ 208 \end{array}$$

72. Exercise:

Copy and multiply:

	a	*b*	*c*	*d*	*e*	*f*
1.	12 $6\frac{1}{3}$	15 $8\frac{2}{3}$	16 $5\frac{3}{4}$	24 $6\frac{2}{3}$	25 $5\frac{3}{5}$	32 $8\frac{3}{8}$
2.	56 $9\frac{3}{8}$	35 $10\frac{2}{5}$	30 $10\frac{3}{5}$	15 $3\frac{1}{2}$	25 $2\frac{1}{2}$	30 $3\frac{1}{4}$

Find the cost of:

3. $1\frac{1}{4}$ pounds of butter at 80 cents a pound.
4. $2\frac{1}{2}$ yards of cloth at 30 cents a yard.
5. $1\frac{1}{4}$ pounds of ham at 32 cents a pound.
6. $1\frac{1}{2}$ dozen eggs at 60 cents a dozen.
7. $2\frac{1}{2}$ tons of coal at $11 a ton.
8. $4\frac{1}{2}$ pounds of beef at 22 cents a pound.
9. $2\frac{1}{4}$ pounds of lard at 32 cents a pound.
10. $1\frac{7}{8}$ pounds of cheese at 40 cents a pound.

How much should be paid:

11. A plumber for $2\frac{1}{2}$ hr. work at $1 an hour?
12. A carpenter for $5\frac{1}{2}$ hr. work at 80¢ an hour?

Comparison

73. Exercise:

1. Begin at the top and compare each number in column *A* with the number opposite in column *B*; thus, *8 is 2 times 4, 18 is 3 times 6,* and so on.

2. Begin at the top and compare each number in column *C* with the number opposite it in column *B*; thus, *2 is* $\frac{1}{2}$ *of 4, 2 is* $\frac{1}{3}$ *of 6,* and so on.

3. Begin at the foot of column *C* and compare each number in it with the number opposite in column *B,* just as you did in example 2.

4. Compare each number in column *A* with the number opposite it in column *C*, reading first down the column and then up.

5. Compare each number in column *B* with the number opposite it in column *A*, reading first down the column and then up.

A	*B*	*C*
8	4	2
18	6	2
24	6	3
24	12	4
16	8	2
24	12	3
36	12	2
48	12	6
60	12	4
20	10	2
30	10	5
40	20	4
60	20	5
48	24	8
50	25	5

6. How many comparisons are you asked to make in examples 1–5, counting only those that you make by reading down the columns?

7. Compare columns *A* and *B* as in example 1, saying the word *cents* after each number; thus, *8 cents is 2 times 4 cents.*

8. Compare columns *C* and *B* as in example 2, saying the word *cents* after each number; thus, *2¢ is* $\frac{1}{2}$ *of 4¢.*

Review of Fractions

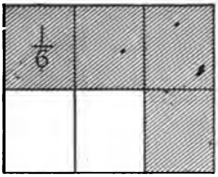


Fig. 1

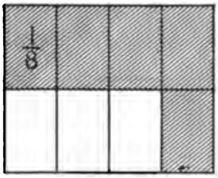


Fig. 2

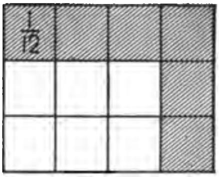


Fig. 3

74. Exercise:

Read, supplying the missing numbers:

(Refer to Fig. 1)

1. $\frac{1}{2}=\frac{}{6}$
2. $\frac{1}{3}=\frac{}{6}$
3. $\frac{2}{2}=\frac{}{6}$
4. $\frac{3}{3}=\frac{}{6}$
5. $\frac{2}{3}=\frac{}{6}$
6. $\frac{1}{2}+\frac{1}{3}=\frac{}{6}$
7. $\frac{1}{2}-\frac{1}{3}=\frac{}{6}$
8. $\frac{1}{2}+\frac{2}{3}=\frac{}{6}$
9. $\frac{2}{3}-\frac{1}{2}=\frac{}{6}$
10. $\frac{5}{6}-\frac{1}{3}=\frac{}{6}$
11. $1-\frac{1}{2}=\frac{}{2}$
12. $1-\frac{1}{3}=\frac{}{3}$
13. $1-\frac{2}{3}=\frac{}{3}$

(Refer to Fig. 2)

14. $\frac{1}{2}=\frac{}{8}$
15. $\frac{1}{4}=\frac{}{8}$
16. $\frac{3}{4}=\frac{}{8}$
17. $\frac{6}{8}=\frac{}{4}$
18. $\frac{4}{8}=\frac{}{2}$
19. $\frac{1}{8}+\frac{1}{8}=\frac{}{8}$
20. $\frac{1}{2}+\frac{1}{8}=\frac{}{8}$
21. $\frac{1}{4}+\frac{1}{8}=\frac{}{8}$
22. $\frac{3}{4}+\frac{1}{8}=\frac{}{8}$
23. $1-\frac{1}{8}=\frac{}{8}$
24. $\frac{1}{4}-\frac{1}{8}=\frac{}{8}$
25. $\frac{3}{4}-\frac{1}{8}=\frac{}{8}$
26. $\frac{3}{4}-\frac{3}{8}=\frac{}{8}$

(Refer to Fig. 3)

27. $\frac{1}{3}=\frac{}{12}$
28. $\frac{1}{4}=\frac{}{12}$
29. $\frac{2}{3}=\frac{}{12}$
30. $\frac{3}{4}=\frac{}{12}$
31. $\frac{1}{3}+\frac{1}{4}=\frac{}{12}$
32. $\frac{1}{3}-\frac{1}{4}=\frac{}{12}$
33. $\frac{2}{3}+\frac{1}{4}=\frac{}{12}$
34. $\frac{3}{4}+\frac{1}{3}=\frac{}{12}$
35. $\frac{2}{3}+\frac{3}{4}=\frac{}{12}$
36. $\frac{2}{3}-\frac{1}{4}=\frac{}{12}$
37. $\frac{3}{4}-\frac{2}{3}=\frac{}{12}$
38. $1-\frac{1}{12}=\frac{}{12}$
39. $1-\frac{7}{12}=\frac{}{12}$

75. Exercise:

1. Name at sight the whole or mixed number equal to: $\frac{10}{3}$; $\frac{3}{3}$; $\frac{5}{2}$; $\frac{11}{4}$; $\frac{9}{2}$; $\frac{4}{4}$; $\frac{25}{3}$; $\frac{25}{4}$; $\frac{10}{10}$; $\frac{16}{3}$.

2. Write ten fractions like those in example 1. Name at sight the whole or mixed number equal to each.

3. What will $\frac{1}{4}$ of a yard of lace cost at 40¢ a yard? What will $\frac{3}{4}$ of a yard cost?

4. What is the cost of one marble if you pay 1 cent for 2 marbles? 1 cent for 4 marbles? 1 cent for 5 marbles?

5. Twenty children were each given a half-pound box of candy. How much candy were they all given?

6. When lemons are selling at 3 for 10¢, how much is that a dozen?

(*Think:* 1 dozen = four 3's.)

7. When oranges are selling at 2 for 5¢, how much is that a dozen? How much must be paid for 6 oranges?

8. How many pint jars are needed to hold $\frac{3}{4}$ of a gallon of cream?

9. What does a newsboy gain on 60 papers which he bought at $1\frac{1}{4}$¢ each and sold at 2¢ each?

Find the cost of:

10. $1\frac{1}{2}$ yards of gingham at 60¢ a yard.

11. 10 towels at $12\frac{1}{2}$ cents each; at $37\frac{1}{2}$ cents each.

12. 20 yards of dress goods at \$$1\frac{3}{4}$ a yard.

13. 30 yards of rope at $3\frac{1}{3}$ cents a yard.

14. Three men hired a car, each paying \$$6\frac{1}{4}$. How much did they all pay?

76. Exercise:

At a Play Festival held by the Garfield School, Tom, Fred, and Will made the best records in three contests and won the three highest prizes in each contest. Here are their records:

	100-Yard Dash	Running Broad Jump	High Jump
Tom	$11\frac{1}{5}$ sec.	8 ft. 1 in.	4 ft. 5 in.
Fred	$12\frac{3}{5}$ sec.	8 ft. 3 in.	4 ft. 10 in.
Will	$11\frac{4}{5}$ sec.	7 ft. 1 in.	4 ft. 4 in.

1. Which of these boys won first prize in the 100-yard dash? Which won second prize?

2. Which won first prize in the running broad jump? Which won second prize?

3. Which won first prize in the high jump? Which won second prize?

4. In the 100-yard dash, what was the difference between Will's time and Tom's? between Fred's and Tom's? between Fred's and Will's?

5. In the running broad jump how much longer was Fred's jump than Tom's? how much longer than Will's?

6. In the high jump, Fred's record was how much better than Tom's? how much better than Will's?

7. What is the best record that you can make in a 100-yard dash?

8. Ben ran a quarter of a mile in $1\frac{5}{6}$ minutes. His time was how much less than 2 minutes? He ran the quarter of a mile in how many seconds?

77. Exercise:

Charles made these records of the thickness of the ice on our skating pond:

	8 A.M.	5 P.M.
Monday	$4\frac{1}{4}$ in.	5 in.
Tuesday	$5\frac{3}{4}$ in.	6 in.
Wednesday	$6\frac{1}{2}$ in.	7 in.

What was the increase in thickness:

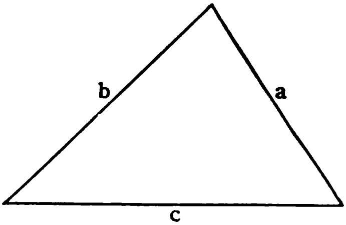
1. Between 8 A.M. and 5 P.M. Monday? Tuesday?
2. Between 5 P.M. Monday and 8 A.M. Tuesday?
3. Between 5 P.M. Tuesday and 8 A.M. Wednesday?
4. Between 8 A.M. Monday and 5 P.M. Tuesday?
5. Between 8 A.M. Monday and 5 P.M. Wednesday?

Call the *sides* of the *triangle* *a*, *b*, and *c*.

6. Measure *a*; *b*; *c*. How long is each?

7. What is the sum of the sides *a* and *b*? *a* and *c*? *b* and *c*? *a*, *b*, and *c*?

8. How much longer is *c* than *b*? *c* than *a*? *b* than *a*?



TRIANGLE

9. Measure the length of a page of this book; measure the width. What is the distance around the page?

10. If you have saved $\frac{3}{4}$ of a dollar, how much more must you save to have 1 dollar? to have 2 dollars? 3 dollars? 4 dollars? $1\frac{1}{4}$ dollars? $1\frac{1}{2}$ dollars? $1\frac{3}{4}$ dollars? $2\frac{1}{2}$ dollars?

78. The coins of the United States now in use are:

Gold	Silver	Nickel	Bronze
double eagle	dollar	five cents	one cent
eagle	half dollar		
half eagle	quarter dollar		
quarter eagle	dime		

79. **Table**

10 cents (¢) = 1 dime (d.)

10 dimes = 1 dollar ($)

100 cents = 1 dollar

10 dollars = 1 eagle

80. Exercise:

1. What do we call the place at which coins are made by the United States Government?

2. Name our gold coins. Which of them have you seen?

3. A double eagle is worth how many dollars? a half eagle? a quarter eagle?

4. Name our silver coins and tell how many cents each is worth.

5. Which of our coins has the least value?

6. Which of our coins are each worth less than a dime?

7. The mints of the United States in one year produced 3,679,000 half dollars, 15,104,000 quarters, 54,529,000 dimes, 76,395,000 five-cent pieces, and 588,935,000 pennies. What was the total number of coins which the mints produced that year?

81. Exercise:

1. A full set of our gold coins is worth how much?
2. A full set of our silver coins is worth how much?
3. A full set of all our coins is worth how much?

Read examples 4–9, supplying the missing numbers:

4. 3*d.* = —¢; 5*d.* = —¢; 7*d.* = —¢; 9*d.* = —¢.
5. 40¢ = — *d.*; 60¢ = — *d.*; 70¢ = — *d.*; 90¢ = — *d.*
6. $\$\frac{1}{2}$ = —¢; $\$\frac{1}{4}$ = —¢; $\$\frac{1}{10}$ = —¢; $\$\frac{3}{4}$ = —¢.
7. 100¢ = $—; 300¢ = $—; 500¢ = $—; 700¢ = $—.
8. A half dollar is worth — dimes.
9. A quarter dollar is worth — nickels.

2 dimes 6 cents may be written $0.26.

10. Write, using the dollar sign:

3 dimes 5 cents; 6 dimes 8 cents; 4 dimes 2 cents; 8 dimes 1 cent; 7 dimes 6 cents; 9 dimes; 5 dimes.

Notice that dimes are written in the first place to the right of the decimal point and cents (less than ten cents) in the second place.

Supply the missing numbers:

11. $0.75 = — dimes and — cents
12. $0.43 = — dimes and — cents
13. $0.62 = — dimes and — cents
14. $0.89 = — dimes and — cents
15. $5.87 = $— + —*d.* + —¢; $8.95 = $— + —*d.* + —¢.
16. $0.85 = $— + —*d.* + —¢; $9.50 = $— + —*d.* + —¢.
17. $5 + 3*d.* + 8¢ = $—; $9 + 7*d.* + 5¢ = $—.

82. You have already learned how to write and read a sum of money made up of dollars and cents (see page 86).

Thus, *3 dollars 35 cents* is written *$3.35*, and *6 dollars 7 cents* is written *$6.07*. *35 cents* may be written *$0.35*.

83. Exercise:

Read:

1. $5.42; $1.53; $0.47; $3.51; $4.62; $0.76.
2. $0.05; $0.34; $7.45; $0.08; $2.73; $7.09.
3. $9.65; $6.85; $10.50; $12.35; $5.97; $8.37.

4. Write in a column as your teacher dictates them the sums of money given in example 1, and add. Do the same with the sums in example 2; with those in example 3.

Dollars may be changed to cents thus:

$3 = 3 × 100¢ = 300¢

Dollars and cents may be changed to cents thus:

$3.56 = 300¢ + 56¢ = 356¢

Complete columns *b* and *c*, as in column *a*:

	a	*b*	*c*
5.	$4 = 400¢	$3 = —¢	$7 = —¢
6.	200¢ = $2	500¢ = $—	175¢ = $—
7.	$2.85 = 285¢	$1.25 = —¢	$0.18 = —¢

8. Read, and then tell how many cents each is worth:

$2 $3.18 $7 $2.90
$1.10 $1.08 $10.80 $3.50

9. Tell what each of these is equal to in dollars and cents:

125¢ 250¢ 380¢ 175¢
501¢ 310¢ 417¢ 812¢

Breakfast Card

Apples	**15¢**
Apple sauce	**15¢**
Baked apples and cream	**20¢**
Grape fruit	**30¢**
Grapes	**25¢**
Oranges	**20¢**
Strawberries and cream	**40¢**
Sliced Hawaiian pineapple	**25¢**
Stewed prunes	**15¢**
Bananas and cream	**20¢**
Grape-nuts and cream	**20¢**
Oatmeal and cream	**20¢**
Shredded wheat and cream	**20¢**
Broiled shad	**50¢**
Broiled bluefish	**50¢**
Broiled Spanish mackerel	**50¢**
Codfish cakes	**25¢**
Salt mackerel	**40¢**
Salt codfish in cream	**40¢**
Calf's liver and bacon	**50¢**
Sausage	**40¢**
Broiled ham	**35¢**
Pork chops	**50¢**
Fried mush	**25¢**
Fried eggs	**30¢**
Breakfast bacon	**35¢**
Chicken hash with poached egg	**60¢**
Minced ham and scrambled eggs	**40¢**
Veal cutlet, breaded, tomato sauce	**50¢**
Corned beef hash	**30¢**
Buckwheat cakes	**25¢**
English muffins	**15¢**
Sauté potatoes	**15¢**
Wheat cakes	**25¢**
Coffee	**10¢**

84. Exercise:

Find from the breakfast card, page 230, the cost of the following orders:

1. Oranges, oatmeal and cream, and wheat cakes
2. Bananas and cream, shredded wheat and cream, fried eggs, and buckwheat cakes.
3. Baked apples and cream, oatmeal and cream, sausage, and wheat cakes.
4. Strawberries and cream, fried eggs, and English muffins.
5. Grape fruit, shredded wheat and cream, pork chops, and wheat cakes.
6. Grape-nuts and cream, breakfast bacon, and buckwheat cakes.

Order from the breakfast card fruit or fruit and cream, cereal and cream, and fish, eggs, or meat, the breakfast to cost:

7. 60¢   8. 85¢   9. 90¢   10. 80¢
11. 65¢   12. 75¢   13. 95¢   14. 70¢
15. $1.20   16. $1.05   17. $1.00   18. $1.10

Order from the breakfast card, a breakfast to cost:

19.	95¢	$1.00	$1.05	80¢	50¢
20.	$1.10	$1.15	90¢	85¢	45¢
21.	75¢	70¢	$1.20	$1.25	40¢
22.	$1.30	60¢	$1.35	65¢	55¢

85. Exercise:

1. Here is a leaf from a boy's cash account; how much more did he receive than he paid out during the month?

CASH ACCOUNT — OCTOBER

DATE	ITEM	RECEIVED		PAID	
1	Errand		10		
1	Pigeons		50		
2	Tablet				10
2	Pencil				05
4	Errand		10		
5	Papers		50		25
7	Car fare				05
8	Errand		10		
10	Apples				05
12	Papers		50		25
13	Collection				05
15	Errand		10		
17	Ball				10
19	Football game				25
19	Papers		50		25
20	Collection				05
23	Errand		10		
25	Thrift stamp				50
26	Papers		50		25
27	Collection				05
30	Hospital				15

86. Exercise:

1. Here is a kitchen outfit arranged by a large department store; find the total cost of the outfit at the prices given.

Two-burner Oil Stove	$9.00
Galvanized Washtub	1.50
Washboard	.45
Three Dozen Clothes Pins	.15
Ironing Board, 4 feet	1.20
Meat Board	.60
Soap Cup	.15
Clothes Line, 75 feet	.75
Galvanized Coal Bucket	.65
Galvanized Water Pail, 12 quarts	.55
Frying Pan, Cast Iron	.90
Potato Masher	.10
Flour Bucket	.50
Galvanized Teakettle	1.00
Tin Dishpan	.90
Salt Dredger	.10
Flour Dredger	.10
Colander	.25
Egg Whip	.10
Wash Boiler	1.00
Cake Turner	.10
Cake Pans, two	.20
Pie Pans, three	.30
Coffee Canister	.45
Tea Canister	.45
Sugar Can	.60
Coffee Pot, 2 quarts	.95
Teapot, 1½ quarts	.90
Agate Cooking Pot, 4 quarts	.90
Agate Lipped Sauce Pan, 2 quarts	.60
Broom	.75
Chamois	.50
Dust Brush	.35
Floor Brush	1.50
Scrubbing Brush	.15
Food Chopper	2.00
Kitchen Knife	.50
Paring Knife	.20
Total	

Look at the list and tell at sight what you must pay for:

2. A galvanized washtub and an ironing board.

3. A 75-foot clothes line and a wash boiler.

4. A coffee pot and a sugar can.

5. A floor brush and a dust brush.

6. A broom and a dust brush.

7. A galvanized teakettle and a teapot.

8. A food chopper and a meat board.

9. A galvanized coal bucket and a colander.

10. Name three articles on this list which you can buy for $0.90; $2.50; $10; $1.90; $0.50; $1.60.

87. Memorize this table:

50¢ = \$.50 = \$$\frac{1}{2}$
25¢ = \$.25 = \$$\frac{1}{4}$
75¢ = \$.75 = \$$\frac{3}{4}$

88. Exercise:

1. Find the cost of 4 window shades at \$.75 each.

Think: \$.75 = \$$\frac{3}{4}$;
4 × \$$\frac{3}{4}$ = \$3.

Find the cost of:

2. 4 lb. tea at \$.75 per pound.
3. 8 yd. gingham at \$.50 per yard.
4. 6 bottles olives at \$.50 per bottle.
5. 14 yd. linen at \$.75 per yard.
6. 12 lb. coffee at \$.50 per pound.
7. 16 yd. silk at \$1.50 per yard.
8. 24 bu. oats at \$1.00 per bushel.
9. 48 bu. corn at \$1.50 per bushel.
10. 36 yd. ribbon at \$.25 per yard.
11. 24 doz. eggs at \$.75 per dozen.
12. 18 lb. butter at \$.75 per pound.
13. 22 doz. oranges at \$.50 per dozen.
14. 34 baskets tomatoes at \$.50 per basket.
15. 32 pk. potatoes at \$.75 per peck.
16. 8 yd. lace at \$1.75 per yard.
17. 2 doz. baseballs at \$2.25 per dozen.
18. 4 yd. serge at \$2.50 per yard.
19. 10 bu. potatoes at \$2.75 per bushel.

89. Exercise:

1. Find the cost of 40 newspapers at 2¢ each.

SUGGESTION. $40 \times 2¢ = 2 \times 40¢$.

2. How much should a boy receive for 25 two-cent boxes of matches? for 50 two-cent boxes?

3. Find the cost of 30 three-cent postage stamps.

4. A druggist sold in one evening 45 five-cent soda tickets; how much did he receive for them?

5. How many cents are 20 five-cent pieces worth?

6. How many dollars are 20 dimes and 20 five-cent pieces worth? 100 dimes? 100 nickels?

7. How many dollars are 4 half dollars and 8 quarters worth? 8 half dollars and 4 quarters?

8. How much does a man earn in 30 days if he is paid $3 a day? How much does he earn in 40 days?

9. Thirty-six $2\frac{1}{2}$-dollar gold pieces are worth how many dollars? how many half dollars?

10. A boy buys 40 newspapers at one cent each; how much does he pay for them?

11. How much car fare does a man pay to ride 50 miles at 3¢ a mile? to ride 100 miles?

12. How much should a bookseller receive for 25 ten-cent tablets? for 30 ten-cent tablets?

13. Twenty five-dollar bills and 10 ten-dollar bills are worth how many dollars?

14. Postage stamps are put up in sheets of 100; find the cost of a sheet of 1-cent stamps; a sheet of 2-cent stamps; a sheet of 3-cent stamps; a sheet of 5-cent stamps.

Prices at a Grocery Store

Apple Butter, per glass	**$.18**	**Peanut Butter, per glass**	**$.15**
Baked Beans, per can	**.14**	**Pears, per can**	**.35**
Clam Chowder, per can	**.15**	**Peas, per can**	**.18**
Condensed Milk, per can	**.25**	**Pineapple, per can**	**.24**
Corn, per can	**.15**	**Prunes, per can**	**.10**
Evaporated Milk, per can	**.10**	**Salmon, per can**	**.35**
Golden Brown Sirup, per can	**.18**	**Shrimp, per can**	**.18**
Grapes, per can	**.17**	**Tomatoes, per can**	**.18**
Jelly, per glass	**.15**	**Tomato Soup, per can**	**.12**
Mustard, per glass	**.06**	**Tuna Fish, per can**	**.30**

90. Exercise:

From the above price list, find the cost of:

1. 2 cans of grapes.
2. 4 cans of prunes.
3. 4 cans of peas.
4. 3 cans of pears.
5. 2 cans of pineapple.
6. 2 cans of salmon.
7. 2 glasses of mustard.
8. 10 cans of baked beans.
9. 8 cans of pineapple.
10. 2 cans of tomato soup.
11. 2 cans of pears.
12. 4 cans of corn.
13. 6 cans of tomatoes.
14. 4 cans of salmon.
15. 2 cans of shrimp.
16. 4 cans of baked beans.
17. 2 cans of tuna fish.
18. 2 cans of clam chowder.
19. 4 glasses of jelly.
20. 4 cans of sirup.
21. 3 glasses of apple butter, 2 cans of corn, 1 glass of jelly, and 2 cans of tomatoes.
22. 1 can of salmon, 2 glasses of apple butter, and 3 cans of condensed milk.
23. 1 can of condensed milk, 5 cans of evaporated milk, 2 cans of prunes, and 5 glasses of peanut butter.

91. How many 8-cent notebooks were bought if $2.56 was their cost?

8)256 $2.56, or 256¢, was the cost of all.
32 $0.08, or 8¢, was the cost of each.
256 ÷ 8, or 32, was the number bought.

92. Exercise:

Find how many can be bought:

1. 2-cent postage stamps for $2.50.
2. 10-cent loaves of bread for $3.20.
3. 8-cent tablets for $3.60.
4. 12-cent bolts of tape for $8.64.
5. 15-cent handkerchiefs for $3.60.
6. 50-cent bottles olive oil for $4.
7. 25-cent ties for $6.25.
8. 12-cent packages of cereal for $2.52.
9. 25-cent packages of biscuit for $6.75.
10. 55-cent bottles of vanilla extract for $3.30.
11. 12-cent cans of corn for $0.60.
12. 5-cent bags of salt for $0.75.
13. 30-cent cans of oatmeal for $1.20.
14. 10-cent packages of puffed wheat for $1.
15. 18-cent glasses of jelly for $1.80.
16. 50-cent balls of twine for $3.50.
17. 15-cent cans of tomatoes for $0.90.
18. 35-cent brooms for $1.40.
19. 15-cent brushes for $3.

Thrift

93. Can you tell what Uncle Sam said to you in his first letter? What did he say to you in his second letter?

UNCLE SAM'S THIRD LETTER

DEAR CHILDREN:

The war savings stamp is better than the 16 thrift stamps, because the United States Treasury Department will pay interest on it, in fact the war savings stamp for which you paid $4 and a few cents, will in five years be worth

Five Dollars

This $5 represents the $4 and a few cents with 4 per cent interest compounded quarterly. Your teacher will tell you what this means when you are in the seventh or eighth grade.

Don't you like my plan for showing school boys and girls how to save money and help their country at the same time?

Yours for thrift,
UNCLE SAM.

94. Exercise (Review pages 45 and 151):

1. Mary bought a war savings stamp. She gave the postmaster 16 thrift stamps and 12 cents in money; how much did he charge her for the war savings stamp? Tell in what month she bought this stamp. Can you tell how much she will get for it if she keeps it for five years? She will get how much more than she paid?

2. Twenty-four pupils in Myrtle's room saved $0.50 each in January. Their savings and how much more will buy 3 war savings stamps in February?

3. If a war savings stamp was bought September 1 of last year, what did it cost? When will it be worth $5?

95. Exercise:

1. Add, naming as many results as possible at sight:

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
$6\frac{1}{2}$	5	15	27	43	35	30	29	27
3	$2\frac{1}{2}$	3	5	34	64	57	71	35
	1							46

j	*k*	*l*	*m*
$7+3\frac{1}{4}$	$4+3+7$	$\frac{1}{2}+\frac{1}{2}$	$\frac{1}{4}+\frac{2}{4}+\frac{3}{4}+\frac{1}{4}$

n	*o*	*p*	*q*
$\frac{1}{2}+\frac{1}{4}$	$1+\frac{1}{4}+\frac{1}{4}$	$2\frac{1}{2}+2\frac{1}{2}$	$3\frac{1}{4}+2\frac{3}{4}+1\frac{1}{2}$

2. Divide, naming as many results as possible at sight:

a	*b*	*c*	*d*	*e*	*f*	*g*
$5\overline{)11}$	$4\overline{)29}$	$1\overline{)7}$	$6\overline{)0}$	$28 \div 3$	$7 \div 7$	$17 \div 2$

h	*i*	*j*	*k*	*l*
$40 \div 6$	$\frac{1}{4}$ of 248	$6\overline{)7524}$	$49\overline{)1274}$	$69\overline{)4010}$

3. Tell what each figure stands for in 426; in 8752; in 1,111,111.

4. When eggs are selling at 60¢ a dozen, how much must I pay for $\frac{1}{2}$ doz.? $1\frac{1}{2}$ doz.? 2 doz.? $2\frac{1}{2}$ doz.?

5. If wool dress goods are $ 1.96 a yard, find the cost of:

a	*b*	*c*	*d*	*e*	*f*
3 yd.	$3\frac{1}{2}$ yd.	$4\frac{1}{2}$ yd.	$5\frac{1}{2}$ yd.	$4\frac{3}{4}$ yd.	$3\frac{3}{4}$ yd.

6. 500 bedspreads were sold at $ 6.50 each. The regular price was $ 9 each. How much less than the regular price was received for them?

96. Exercise:

1. Write all the sets of three different whole numbers whose sum is 16. Have no two sets alike.

2. Find the cost of a turkey that weighs $16\frac{1}{2}$ lb. at $ 0.60 a pound.

3. A $ 5-bill is worth how many nickels?

4. At a refreshment stand, a girl sold 4 gal. of lemonade at 5¢ a glass. The glasses held one half pint each. How much did she receive for the lemonade?

5. What is the cost of one article if you buy:

2 for 1¢? 3 for 1¢? 4 for 1¢? 5 for 1¢?
2 for 3¢? 2 for 5¢? 3 for 10¢? 4 for 10¢?
3 for 25¢? 4 for 25¢? 6 for 25¢? 3 for 50¢?

6. A train that usually arrives at our station at 8.10 was 30 minutes late this morning. When did it arrive?

7. May has saved $ 4.75. How much more does she need to buy a dress for $ 5.50 and a hat for $ 3.75?

8. Counting $2\frac{1}{2}$ cups of powdered sugar to the pound, how many cups of this kind of sugar will 4 lb. make?

9. What should $\frac{1}{4}$ lb. of caramels cost at 60¢ a pound? What should $\frac{3}{4}$ lb. cost?

10. Margaret's father is an engineer; he earns $ 325 a month and his expenses are $ 205. In how many months can he save enough to pay for a house that cost him $ 8400? In how many years?

11. If a family wastes 4 oz. of butter a week, how many pounds do they waste in 52 weeks, or 1 year? If butter costs $ 0.80 a pound, how much money is wasted?

97. Exercise:

1. Mrs. Smith wastes $\frac{1}{10}$ of the potato in paring it. What is the money loss on a peck of potatoes costing 60¢? What is the money loss on 2 bu. of potatoes?

2. Mr. and Mrs. Lee each drink 2 cups of coffee a day and use 2 lumps of sugar to each cup of coffee. How many days will a pound of sugar last them for this use, if there are 80 lumps to a pound?

3. What change should a man receive from a $20-bill given in payment for four railroad fares at $2.82 each and two at $1.40 each?

4. Andrew's mother told him that a boy 10 years old should drink a quart of milk a day. Andrew found the cost of the milk which a boy this old should drink during March. What was the cost if the price of milk is 14¢ a quart?

5. William helps in his father's market. He filled this order for Mrs. Raub and gave her the correct change from a $2-bill which she gave him in payment. How much change did he give her?

Slice of Ham, $\frac{3}{4}$ lb., at 40¢ per pound.
Lamb Chops, 2 lb., at 30¢ per pound.
Dried Beef, $\frac{1}{2}$ lb., at 30¢ per pound.

6. Find the cost of the following material which Clara bought for a one-piece doll's dress:

$\frac{3}{4}$ yd. organdie at $1.60 a yard.
$\frac{3}{4}$ yd. lace insertion at $0.60 a yard.
$1\frac{1}{2}$ yd. lace edging at $0.60 a yard.
$\frac{1}{4}$ yd. beading at $0.36 a yard.
$\frac{5}{8}$ yd. ribbon at $0.48 a yard.

98. A Receipted Bill for Goods Purchased on the Same Date

New York, May 1, 1920.

Mr. John Williams,

To PARK & TILFORD

Grocers Fifth Ave. & 42d St.

2 Loaves Bread @ 10¢		20		
2 Cans Peaches @ 30¢		60		
1½ lb. Cheese @ 32¢		48		
2 lb. Butter @ 80¢	1	60		
3 doz. Eggs @ 70¢	2	10	4	98
Received Payment Park & Tilford				

99. Exercise:

1. Who purchased this bill of goods?

2. At whose store were these goods bought?

3. There are five **items** in this bill; name them.

4. What is the cost of the first item? the second? the third? the fourth? the fifth? of all five?

A bill is **filled** by writing in it the cost of each item, and **footed** by adding the cost of the different items to find the total cost.

5. Is the correct footing of this bill $4.98?

6. To whom was this bill paid?

7. What shows that it has been paid?

100. Exercise:

Rule bill forms and on them make out bills for the following goods. Use your own name for that of the buyer and the name of some firm or person that deals in the goods purchased for that of the seller. Fill, foot, and receipt the bills, dating them properly.

1.

6 lb. coffee, 42¢
2 lb. lard, 28¢
12 lb. sugar, 18¢

2.

15 doz. eggs, $0.60
18 lb. butter, $0.80
20 lb. sausage, $0.40

3.

4 lb. ham, 36¢
4 cans corn, 15¢
2 glasses currant jelly, 18¢

4.

2 pkg. puffed wheat, 15¢
$\frac{1}{2}$ lb. tea, 60¢
$1\frac{1}{2}$ lb. dried beef, 40¢

5.

4 yd. gingham, 60¢
2 yd. lace, 30¢
$1\frac{1}{4}$ yd. ribbon, 40¢
$1\frac{3}{4}$ yd. insertion, 28¢

6.

$1\frac{1}{2}$ lb. ham, 36¢
2 lb. country sausage, 45¢
$1\frac{1}{2}$ lb. potato salad, 30¢
$2\frac{1}{4}$ lb. scrapple, 20¢

7.

1 box Nabisco, 18¢
2 pkg. cookies, 15¢
$\frac{1}{2}$ lb. chocolate buds, 80¢
$1\frac{1}{2}$ qt. ice cream, 50¢

8.

$2\frac{1}{2}$ lb. prunes, 28¢
2 mackerel, 13¢ each
$1\frac{1}{4}$ lb. cheese, 40¢
$\frac{3}{4}$ lb. beans, 24¢

Ask at home to be shown receipted bills, and, if convenient, bring them to school to show to the class. Also, if possible, get blank forms from stores near your home and use them.

(Review Liquid Measures, Dry Measures, and Measures of Weight, pages 120–123.)

Measures of Time

101. Exercise:

1. Name the months of the year.

2. Name the months that have each thirty days.

3. Name the months that have each thirty-one days.

4. Name the present month.

5. What month will next month be?

6. What month was last month?

7. Name the sixth month; the third; the tenth.

8. What year is this?

9. What year was last year?

10. What year will next year be?

11. Write the present date.

12. Name the days of the week.

13. Name the first day of the week; the sixth; the seventh; the fifth; the fourth; the second; the third.

14. How many hours make a day?

15. How many hours are there in the forenoon? the afternoon? How many hours are there from noon to midnight?

16. Write in a short way:

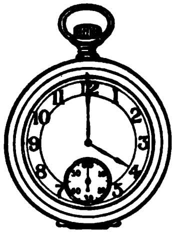
6 o'clock, forenoon; 9 o'clock, afternoon.

17. Tell what each of these means:

10.15 A.M.; 1.40 P.M.; 12.01 A.M.; 12.01 P.M.

18. Tell which of these times are day time and which are night: 11.00 P.M.; 2.30 A.M.; 11.00 A.M.; 2.30 P.M.

102. Exercise :



1. How many hands has this watch?

2. What is the name of the smallest hand? What are the other hands called?

3. Count sixty while the second hand goes once around the small dial; you have counted sixty **seconds**, or one minute.

Table

60 seconds (sec.) = 1 minute (min.)
60 minutes = 1 hour (hr.)
24 hours = 1 day (da.)
7 days = 1 week (wk.)
28, 29, 30, or 31 days = 1 month (mo.)
12 months = 1 year (yr.)
365 days = 1 common year
366 days = 1 leap year

4. How many seconds are there in 2 min.? 3 min.? $\frac{1}{2}$ min.? $\frac{1}{4}$ min.? $\frac{1}{6}$ min.? $\frac{1}{10}$ min.?

5. How many minutes are there in 3 hr.? $\frac{1}{2}$ hr.? $1\frac{1}{2}$ hr.? $\frac{1}{3}$ hr.? $\frac{2}{3}$ hr.? $\frac{1}{4}$ hr.? $\frac{3}{4}$ hr.?

6. How many hours are there in 2 da.? $\frac{1}{2}$ da.? $1\frac{1}{2}$ da.? $2\frac{1}{2}$ da.? $\frac{1}{4}$ da.? $\frac{3}{4}$ da.? $\frac{1}{6}$ da.? $\frac{5}{6}$ da.?

7. What part of a day is 12 hr.? 6 hr.? 8 hr.?

8. Repeat the table of time.

A Fourth Grade School Program

Time	Recitation	Study Period
9.00 to 9.10	Opening Exercises	
9.10 to 9.30	Spelling	
9.30 to 9.50	Reading, *A*	Arithmetic, *B*
9.50 to 10.10	Arithmetic, *B*	Reading, *A*
10.10 to 10.30	Geography, *A*	Geography, *B*
10.30 to 10.40	Recess	
10.40 to 11.00	Reading, *B*	Arithmetic, *A*
11.00 to 11.20	Arithmetic, *A*	Reading, *B*
11.20 to 11.40	Geography, *B*	Geography, *A*
1.15 to 1.30	Music	
1.30 to 1.50	Writing	
1.50 to 2.00	Physical Exercises	
2.00 to 2.15	English	
2.15 to 2.25	Word Drill, *A*	Arithmetic, *B* (Correct papers)
2.25 to 2.35	Word Drill, *B*	Arithmetic, *A* (Correct papers)
2.35 to 2.50	Declamation, History, or Hygiene	

103. Exercise:

1. Find the time given to opening exercises; to writing; to recess; to music; to spelling; to physical exercises; to English; to declamation, history, or hygiene.

2. How much time does the *A* class spend in studying and reciting reading? geography? arithmetic?

3. Answer the same questions for the *B* class.

4. How much time is given to word drill in each class?

5. Each class spends some time in the afternoon correcting errors made that day in the written work in arithmetic; how much time?

104. Table

12 inches (in.) = 1 foot (ft.)
3 feet = 1 yard (yd.)
$5\frac{1}{2}$ yards = 1 rod (rd.)
320 rods = 1 mile (mi.)
$\left.\begin{matrix}1760\text{ yd.}\\ 5280\text{ ft.}\end{matrix}\right\} = 1$ mile

To the Teacher. In teaching measures the pupil should frequently be called on for estimates, when it is convenient for him to test the accuracy of his judgment. He should be able to use the various units employed in measures.

105. Exercise:

(Answer as many as possible at sight.)

1. How many inches are there in 2 ft.? 3 ft.? 4 ft.?
2. How many feet are there in 2 yd.? 5 yd.? 8 yd.?
3. How many inches are there in $\frac{1}{2}$ ft.? $\frac{1}{3}$ ft.? $\frac{1}{4}$ ft.?
4. How many feet are there in $\frac{1}{2}$ yd.? $1\frac{1}{2}$ yd.? $2\frac{1}{2}$ yd.?

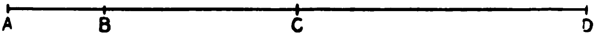
Supply the missing numbers in examples 5–10.

5. 24 in. = — ft.; 36 in. = — ft.; 48 in. = — ft.
6. 15 in. = — ft. — in.; 28 in. = — ft. — in.
7. 12 ft. = — yd.; 24 ft. = — yd.; 60 ft. = — yd.
8. $5\frac{1}{2}$ yd. = — ft.; 1 rd. = — ft.
9. 320 rd. = $320 \times 5\frac{1}{2}$ yd., or — yd.
10. 320 rd. = $320 \times 16\frac{1}{2}$ ft., or — ft.
11. How many yards are there in 2 rd.? in 3 rd.?
12. How many rods are there in 2 mi.? in $\frac{1}{2}$ mi.? in $1\frac{1}{2}$ mi.? in $10\frac{1}{2}$ mi.?
13. Repeat the table of length.

Drawing to a Scale

106. Exercise :

1. How long is *AB*? *BC*? *CD*? *AD*? *AC*? *BD*? (Measure each.)



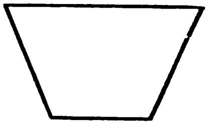
If *BC* represents 10 ft., we say that *AD* is drawn to a **scale** of 1 in. to 10 ft.; and we write:

Scale: 1 in. = 10 ft.; or in practice 1″ = 10′.

2. When the scale is 1″ = 10′, what is the distance from: *C* to *D* (Fig. ex. 1)? *A* to *B*? *A* to *D*? *B* to *D*?

3. When the scale is 1″ = 100′, what is the distance from: *B* to *C* (Fig. ex. 1)? *B* to *A*? *B* to *D*? *C* to *A*?

4. In this *plan*, or *map*, of a field, how long is each side?



Scale: 1″ = 40 rd.

Draw a plan of the following:

5. A square 100 ft. long; scale: 1″ = 20′.

6. A square 10 yd. long; scale: 1″ = 2 yd.

7. A floor 24 ft. long, 18 ft. wide; scale: 1″ = 6′.

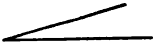
8. A field 80 rd. long, 20 rd. wide; scale: 1″ = 20 rd.

9. How far are two cities apart if the distance between them is shown on a map to be 2½ in.; scale: 1″ = 100 mi.?

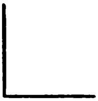
10. How far are two cities apart if the distance between them is shown on a map to be 3 in.; scale: 1″ = 7½ mi.?

Angles

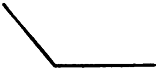
107. The opening between two straight lines that meet is called an **angle.**



Acute Angle



Right Angle

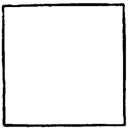


Obtuse Angle

1. Point to lines in the room that form a right angle.
2. Draw an acute angle; an obtuse angle.

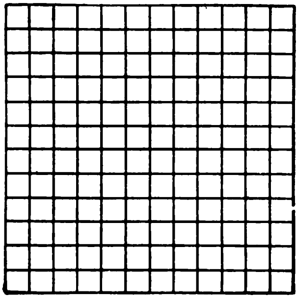
The Square

108. Exercise:



Square

1. How many angles has a square?
2. What kind of angles has a square?
3. How many sides has a square? How do they compare in length?



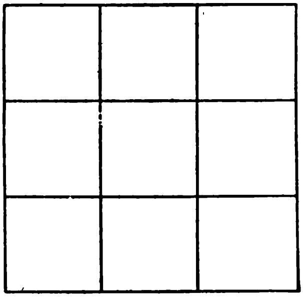
Here is a square representing a square foot divided into square inches; scale: 1″ = 8″.

4. How many square inches are there in one row?
5. How many rows of square inches are there?
6. How many square inches are there in the square?

144 square inches = 1 square foot.

7. How many square inches are there in $\frac{1}{2}$ of a square foot? $\frac{1}{4}$ of a square foot? $\frac{1}{8}$ of a square foot?

109. Exercise:



1. This drawing represents a square yard divided into square feet; what is the scale?

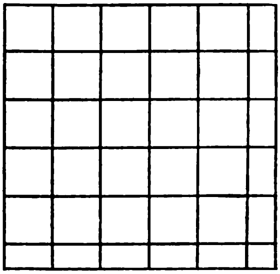
2. How many square feet are there in a square yard?

3. How many square feet are there in $2\frac{1}{2}$ square yards?

4. How many square yards are there in 18 square feet?

5. 20 sq. ft. = — sq. yd. — sq. ft.

This drawing represents a square 1 rod long (scale 1″ = 4 yd.) divided as nearly as possible into square yards.



Scale: 1″ = 4 yd.

6. What does each of the large squares represent?

7. What does the small square represent?

8. What does each rectangle, or *oblong*, represent? (See page 128.)

9. How many large squares are there? How many oblongs?

10. How many oblongs represent a square yard?

11. Counting two oblongs as 1 square yard and the small square as $\frac{1}{4}$ square yard, tell how many square yards the drawing represents.

$30\frac{1}{4}$ square yards = 1 square rod.

110. **Table**

144 square inches (sq. in.) = 1 square foot (sq. ft.)
9 square feet = 1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards = 1 square rod (sq. rd.)
160 square rods = 1 acre (A.)

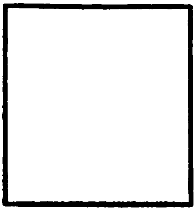
111. Exercise:

1. How many square yards are there in 2 square rods? 4 square rods? 10 square rods?

2. How many square yards are there in 20 square rods? 40 square rods? 80 square rods?

This drawing represents a square 20 rd. long. Measure one side of it.

3. How many squares each 1 rd. long could be placed along one side of this square? How many rows of such squares could be placed in the whole square?



Scale: 1″ = 20 rd.

20×20, or $400 =$ the number of square rods in the square.

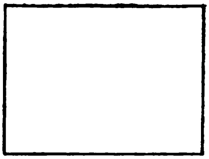
4. How many square rods are there in a square 10 rd. long? 30 rd. long? 40 rd. long?

5. Make a drawing of a tract of land in the form of a square 80 rd. long; scale: 1″ = 20 rd. How many acres are there in the square?

6. Make a drawing of a tract of land in the form of a square 60 rd. long; scale: 1″ = 6 rd. How many acres are there in the square?

The Rectangle

112. Exercise:

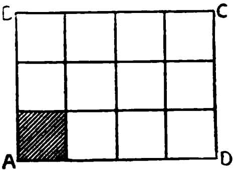


Rectangle

1. How many sides has a rectangle?

2. How do the opposite sides of a rectangle compare in length?

3. How many angles has a rectangle? What kind?



Scale: 1″ = 4″

4. *ABCD* represents a rectangle 4 in. long and 3 in. wide, divided into square inches. How many square inches are there in 1 row of *ABCD*? How many rows? How many square inches are there in *ABCD*?

5. How many square inches are there in a rectangle 4 in. long and 3 in. wide (4 in. by 3 in.)?

6. How many square inches are there in a rectangle:
4 in. by 2 in.? 6 in. by 4 in.? 8 in. by 6 in.?

7. How many square feet are there in a rectangle:
8 ft. by 4 ft.? 10 ft. by 6 ft.? 20 ft. by $\frac{1}{2}$ ft.?

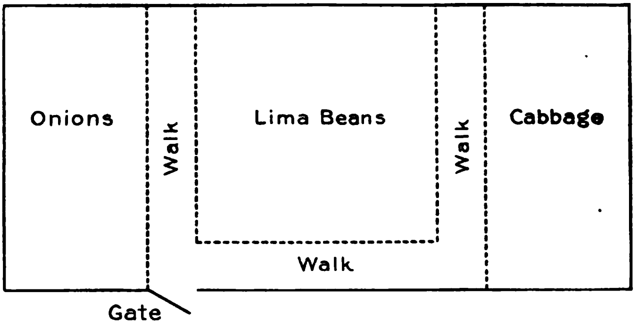
8. How many square yards are there in a rectangle:
5 yd. by 2 yd.? 3 yd. by $\frac{1}{2}$ yd.? 10 yd. by $2\frac{1}{2}$ yd.?

9. How many square feet are there in a side wall of a room 20 ft. long and 8 ft. high?

10. How many square feet are there in the ceiling of a room 30 ft. long and 18 ft. wide?

11. How many square yards of bunting will make a flag $3\frac{1}{2}$ yd. long and 2 yd. wide?

113. **Plan of a Garden**



Scale: 1″ = 4′

114. Exercise:

1. Measure carefully the lines on the above plan.

2. What is the length of the onion bed? the width?

3. What is the length of the cabbage bed? the width?

4. What is the length of the lima bean bed? the width? the distance around it?

5. What is the width of each walk?

6. How long is the walk joining the cabbage bed with the onion bed? How wide is the gate?

7. Make a drawing on the blackboard of this garden; scale: 1″ = 1′. Make a drawing of it on paper; scale: 1″ = 2′.

8. How many feet are there in the distance around this garden? in the distance around the onion bed?

9. How many square feet are there in the onion bed?

10. How many square feet are there in the cabbage bed? in the lima bean bed?

11. How many square feet are there in the walks?

The Cube

115. Exercise:

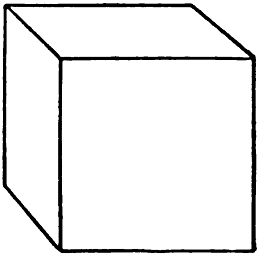


Figure 1

1. How many edges has a cube? how many *faces?* how many *corners?* Measure the edges of a cube to learn that:

The edges of a cube are equal.

2. How long is a front edge of the picture of the cube shown in Figure 1?

A cube each of whose edges is 1 inch long is a cubic inch or a 1-inch cube.

3. Figure 2 represents how many cubic inches, if each cube in it represents a cubic inch?

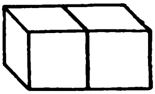


Figure 2

4. Figure 3 contains how many rows such as Figure 2? How many cubic inches does Figure 3 represent?

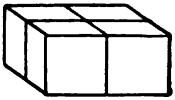


Figure 3

5. Figure 4 contains how many layers such as Figure 3? Figure 4 contains how many cubes?

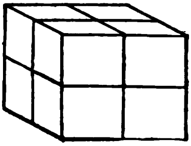


Figure 4

6. If each small cube in Figure 4 represents a cubic inch, Figure 4 represents a cube how long? how wide? how high? How many cubic inches does Figure 4 represent?

7. If the edge of a cube is 2 inches long, 2 × 2 × 2, or —— = the number of cubic inches in the cube.

8. How many cubic inches are there in a cube 3 inches long? 4 inches long? 5 inches long?

116. Exercise:

1. What is meant by a 1-foot cube?

2. How many inches long is a 1-foot cube? How many inches wide? How many inches high?

In this figure representing a cubic foot (scale: 1″ = 8″):

3. How many cubic inches are there in 1 row?

4. How many rows are there in 1 layer?

5. How many cubic inches are there in 1 layer?

6. How many cubic inches are there in the cube?

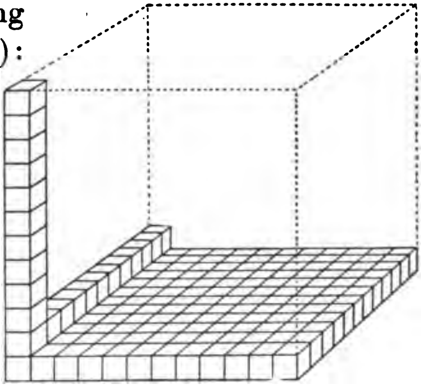


Figure 5

7. 12 × 12 × 12, or — = the number of cubic inches in a cubic foot. What is the number?

This figure represents a cubic yard (scale: 1″ = 3′).

8. How many cubic feet are there in a row?

9. How many rows are there in 1 layer?

10. How many cubic feet are there in 1 layer?

11. How many layers of cubic feet are there in the cube?

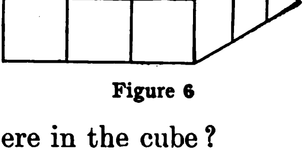


Figure 6

12. How many cubic feet are there in the cube?

117. Table

1728 cubic inches (cu. in.)	**= 1 cubic foot (cu. ft.)**
27 cubic feet	**= 1 cubic yard (cu. yd.)**

118. Exercise:

1. How many cubic feet are there in 2 cu. yd.?

2. How many cubic inches are there in 3 cu. ft.?

3. How many cubic yards are there in 81 cu. ft.?

4. How many cubic inches are there in $\frac{1}{2}$ cu. ft.?

5. How many cubic inches are there in a 3-ft. cube?

6. 1 bu. = $1\frac{1}{4}$ cu. ft., nearly; 12 bu. = about how many cubic feet? 25 bu. = about how many cubic feet?

7. How many cubic feet are there in a cubical box, each edge of which is 2 ft. long?

8. A cubic foot of water weighs $62\frac{1}{2}$ lb. What is the weight of the water that a cubical vessel 2 ft. long will hold?

9. If you have 8 cubical blocks each 1 inch long, you can build them into a cube which is how long? (See Figure 4, page 254.)

10. If you have 27 cubical blocks each 1 inch long, you can build them into a cube which is how long? (See Figure 6, page 255.)

11. What is the product of 12 × 12 × 12?

12. What is the product of 3 × 3 × 3?

13. Repeat the table of cubic measure.

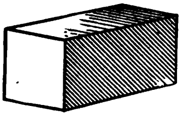
The Rectangular Solid

119. Exercise :

1. How many faces has a rectangular solid?

2. What kind of figures are the faces of a rectangular solid?

3. How many edges has a rectangular solid? How many corners?



Rectangular Solid

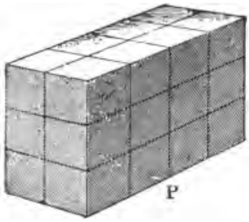
Figure *P* represents a rectangular solid divided into equal cubes.

4. How many cubes are there in each row of the upper layer?

5. How many rows of cubes are there in the upper layer?

6. How many cubes are there in the upper layer?

7. How many layers of cubes are there in the rectangular solid?



3 × 2 × 4 = the number of cubes in *P*.

8. If each cube in *P* were a cubic inch, how many cubic inches would there be in the rectangular solid?

9. If each cube in *P* were a cubic foot, how many cubic feet would there be in the rectangular solid?

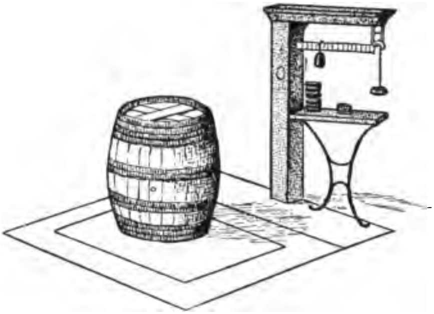
10. How many cubic feet are there in a rectangular solid 4 ft. long, 3 ft. wide, and 5 ft. high?

11. How many cubic inches are there in a rectangular solid 6 in. long, 4 in. wide, and 2 in. high?

Measures of Weight

120. 1. In weighing many heavy articles 100 pounds is called a **hundredweight**.

2. 20 hundredweight, or 2000 pounds, is called a **ton**.



121. **Table**

100 pounds (lb.) = 1 hundredweight (cwt.)
20 hundredweight = 1 ton (T.)
2000 pounds = 1 ton
2240 pounds = 1 long ton

122. Exercise :

1. How many pounds are there in 2 tons? 3 tons? $1\frac{1}{2}$ tons? $2\frac{1}{2}$ tons?

2. How many hundredweight are there in 600 lb.? 800 lb.? 1000 lb.? 1800 lb.?

3. At $0.60 per 100 lb., find the cost of shipping goods weighing 1200 lb.; 1400 lb.; 1500 lb.; 2500 lb.

4. Name the missing numbers: $\frac{1}{2}$ ton = — lb.; $\frac{1}{4}$ ton = — lb.; $\frac{3}{4}$ ton = — lb.

5. How many tons are there in 4000 lb.? 8000 lb.? 6000 lb.? 5000 lb.? 9000 lb.? 2500 lb.?

123. Exercise:

1. How many 100-lb. bales of hay weigh a ton?

2. $\frac{1}{2}$ ton of meal will make how many 10-pound sacks of meal?

3. Counting 50 pounds of onions as 1 bushel, how many bushels are there in 1 ton of onions?

4. At $1.20 per 100 lb., find the cost of shipping furniture weighing 600 lb.

5. What part of a ton is 1000 lb.? 500 lb.? 400 lb.?

6. $\frac{1}{2}$ ton of bran was put up in 50-pound sacks; how many sacks were required?

7. How many tons of hay are there in a load of 20 bales, 125 lb. being taken as the average weight of one bale?

8. How many hundredweight are there in 40 sacks of wheat, each sack weighing 125 lb.?

9. A freight car that is loaded with 40,000 lb. is carrying how many tons?

10. A load of 12 bales of cotton, 500 lb. to the bale, weighs how many tons? How many hundredweight?

11. What should a man pay for 3000 lb. of fertilizer at $ 50 a ton? for 500 lb.?

12. Coal in Pennsylvania is sometimes sold by the long ton; how many pounds should a purchaser of coal in Pennsylvania receive in 2 tons?

13. Find the cost of 50 bales of hay, 100 lb. to the bale, at $ 25 a ton; at $ 30 a ton.

124. Table

12 units = 1 dozen (doz.)
12 dozen = 1 gross (gro.)
20 units = 1 score

125. Exercise:

1. How many eggs are there in $2\frac{1}{2}$ dozen? $5\frac{1}{2}$ doz.?

2. Find the cost of $\frac{1}{2}$ doz. eggs at 50¢ a dozen.

3. 6 eggs out of 3 doz. were broken; how many were unbroken?

4. What should be paid for 8 eggs at 60¢ a dozen?

5. When oranges are selling at the rate of 3 for 15¢, how much is that a dozen?

SUGGESTION. 12 is how many times 3?

6. When matches are selling at the rate of 3 boxes for 5¢, what should be paid for 1 dozen boxes?

7. How much was received for a gross of erasers sold at 5¢ each? at 7¢ each?

Find the gain on:

8. $2\frac{1}{2}$ doz. tablets bought at 60¢ a dozen and sold at 8¢ each.

9. 6 doz. lemons bought at 25¢ a dozen and sold at 3 for 10¢.

10. 6 doz. notebooks bought at $1.20 a dozen and sold at 12¢ each.

11. 1 gross of pencils bought at $5 and sold at 5¢ each.

1. Read: 2092; 30,906; \$27.06; \$0.75; $2\frac{1}{2}$; $\frac{3}{2}$.

2. Count by 10's from 12 to 92; then by 5's.

3. Start at 100 and subtract 10 and 5 in turn; thus, *100*, *90*, *85*, *75*, *70*, and so on.

4. As soon as you have looked at each of these examples, say the right sum:

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1	3	6	6	7	8	9	5	8	7
4	2	3	2	8	4	8	5	8	5
5	5	1	2	0	3	3	5	4	8

5. Write the largest whole number that can be written with the figures 7, 8, and 9, and subtract from it the least whole number that can be written with them.

6. Repeat this table: $9 \times 12 = 108$; $9 \times 11 = 99$, and so on, to 9×1.

7. In the same way repeat the table of 8's; of 7's; of 6's.

8. Name two numbers whose product is 24; 36; 32; 45; 56; 63; 54; 42; 72.

9. Divide at sight, naming quotient and remainder:

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
20)29	15)17	40)81	29)32	30)61	20)85	40)92	30)99

10. Arrange these numbers in pairs such that one of each pair is twice the other: 18, 20, 12, 25, 32, 14, 10, 9, 16, 28, 50, 24.

11. Try to get the six sums in $7\frac{1}{2}$ minutes:

417	835	716	747	508	196
671	689	224	921	721	438
344	568	514	145	504	370
658	324	685	789	297	957
709	856	768	193	965	642
546	797	905	675	183	721
319	558	432	348	659	209
807	139	691	876	870	586
565	201	833	285	346	348

12. Try to get the eight differences in 4 minutes:

861758930	626250541	102406732	527067253
488272680	485707280	65392891	365861290
116813118	10378345	278754376	174073189
43292635	7483071	179746510	92549775

13. Try to get the products in these eight examples in multiplication in 8 minutes:

8527	3496	6249	7538
92	209	83	380
4952	3867	8527	6439
65	506	74	740

14. Try to find the correct quotients to these at the rate of less than 2 minutes for each:

$35\overline{)13335}$	$63\overline{)47250}$	$72\overline{)29448}$	$48\overline{)38976}$
$93\overline{)84165}$	$87\overline{)39672}$	$68\overline{)46104}$	$89\overline{)63368}$

15. A complete aluminum kitchen outfit, suitable for a family of from five to eight, includes the following list; find the total cost at the prices given:

ARTICLE	PRICE
Tea Strainer	$0.15
Coffeepot, 2 qt. . . .	3.40
Teapot, 2 qt.	4.20
Lipped Sauce Pan, 1 qt.	.85
Lipped Sauce Pan, 4 qt.	1.85
Berlin Sauce Pan, 3 qt. .	1.95
Pudding Pan, 2 qt. . .	.72
Pudding Pan, 4 qt. . .	1.60
4 Cake Pans, @ 60¢. .	2.40
Tubed Cake Pan . . .	1.55
4 Bread Pans @ 90¢ .	3.60
Corn Cake Pan, 12 cups .	1.80
Sheet Teakettle, 5 qt. .	5.80
Preserving Kettle, 8 qt. .	2.85
Cover	.74
Double Boiler, 2 qt. . .	3.35
Measuring Cup . . .	.51
6 Pie Plates @ 60¢ . .	3.60
Funnel	.60
Roaster	7.20
Round Griddle . . .	4.20
2 Fry Pans @ $2.40 .	4.80
Colander	2.55
Total	

Find:

16. $\frac{2}{3}$ of 15; $\frac{3}{4}$ of 48.

17. $\frac{5}{6}$ of 60; $\frac{2}{3}$ of 450.

18. $\frac{3}{4}$ of 720; $\frac{5}{6}$ of 600.

19. $\frac{3}{5}$ of 500; $\frac{3}{5}$ of 625.

20. $\frac{3}{10}$ of 1000; $\frac{7}{10}$ of 2000.

Add:

	a	*b*	*c*	*d*
21.	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{4}$
	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{4}$
22.	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{1}{2}$
	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{2}$
23.	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{1}{2}$
	2	3	$2\frac{1}{4}$	$1\frac{1}{2}$
	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$2\frac{1}{4}$

Subtract:

24.	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{7}{8}$	$2\frac{3}{4}$	2	3	$7\frac{1}{2}$
	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{3}{4}$	$5\frac{3}{4}$

The sum of two numbers is found by *adding;* how is the *difference* of two numbers found? the *product?* the *quotient?*

25. What is the sum of 30 and 10? the difference? the product? the quotient?

Tell how to find the answer to each of the following, — by adding, subtracting, multiplying, or dividing:

26. If you know the cost of a ball and the cost of a bat, how do you find the cost of both?

27. If you know how many yards of gingham were bought for Clara's dress, and the price of each yard, how do you find the cost of the gingham bought?

28. If you know how many days of March have passed, how can you find how many days of March remain?

29. If you know how much you spent in a month for ice cream cones and how much each cost, how do you find how many you bought?

30. How do you find the cost of 2 thrift stamps? 3 thrift stamps? *any number* of thrift stamps?

31. If you buy something and give in payment more than the cost of the article bought, how do you find how much change you should receive?

32. If you know the cost of each of several articles bought at different prices, how do you find the cost of all?

33. If you know the number of oranges there are in a box, how do you find how many dozen oranges there are in it?

34. If you know how many feet long a line is, how do you find how many inches long it is?

35. If you know how many quarts a milk can will hold, how do you find how many gallons it will hold?

36. If you know the cost of your father's railroad ticket, the cost of your mother's, and the cost of your own, how do you find the cost of all?

37. If you know how much money you had when you entered a store and how much change you received, how can you find the cost of the articles you bought?

38. How do you change feet to yards? yards to feet?

39. If you know how many quarts of milk your mother uses in a month and what she pays for a quart of milk, how can you find her milk bill for the month?

40. How many marshmallows are there in a box of two layers, each layer containing 3 rows of 6 marshmallows each?

41. How many sixteenths of an inch are there in 1 inch? in 2 inches? in 3 inches?

42. What is the weight of:

100 ten-pound sacks of sugar?
100 twelve-pound sacks of flour?

To the Teacher. The pupil should be encouraged to read problems through carefully and decide what operation or operations are required for the solution of each. In the lower grades, he should not be expected to do more than this in the case of such problems as 26–39 of this and the preceding page. The ability to solve problems in which no specific numbers are given is acquired slowly and, in general, only after problems of the same type *with numbers* have been mastered, and considerable proficiency in the use of language acquired.

43. When you pay 40 cents for $\frac{1}{2}$ lb. of candy, what is the price per pound?

44. A pound of seed will make how many 2-ounce packages?

45. Mother bought a roast for dinner; it weighed $3\frac{1}{4}$ lb. How much did it cost at 32 cents a pound?

46. How much more did a newsboy receive for 300 papers than he paid for them, if they cost him $1\frac{1}{3}$ cents each and he sold them for 2 cents each?

47. Tony shined 24 pairs of shoes in one day at 10 cents a shine, and was given 35 cents in tips; how much did he receive that day?

48. In choosing their class colors, 48 members of the senior class of the high school in our town voted for garnet and gold and the remaining 26 members voted for purple and gold; which colors won and by how many votes?

49. How many yards of thread are there on a dozen spools, 200 yd. to the spool?

50. What is received for 12 doz. pens sold 2 for 1¢?

51. How many feet of molding will reach around a room 24 ft. long and 20 ft. wide?

52. Under fair conditions sweet corn will yield about 2000 lb. per acre. At this rate how many tons should 3 acres yield?

53. A department store that opens at 9 A.M. and closes at 5:30 P.M. is open how many hours?

54. A government supply house sold paint in cases of 6 gallons to the case at $2.50 a gallon. What was the selling price of a case of this paint?

55. Will's brother owns a motorcycle which makes 75 miles on a gallon of gasoline. How many gallons of gasoline will this machine use in making 150 miles? 225 miles?

56. Find the cost of sharpening 50 safety razor blades at 2 cents each.

57. Frank's father built a small apartment house of 3 stories. He rented the first floor for $40 a month, the second for $30, and the third for $25. How much rent does he receive in a year from this house?

58. A train left Chicago for New York carrying 247 passengers. Before it arrived in New York 116 passengers got off at different stops and 216 got on. How many passengers did the train carry into New York?

59. Harry shoveled snow from 8 o'clock one morning till noon. He was paid 30 cents an hour; how much was he paid for this work?

60. How much cloth is needed to make father's suit, allowing $1\frac{1}{3}$ yd. for the trousers, $\frac{3}{4}$ yd. for the vest, and 2 yd. for the coat?

61. Find the cost of $2\frac{1}{4}$ yd. of lining needed for father's suit at $2 a yard.

62. How many days are there from Lincoln's Birthday to Washington's Birthday?

63. Write the five largest of the following numbers on a line; then write the other five beneath them and arranged so that each lower number is $\frac{1}{2}$ of the one above it:

9 5 14 16 18 8 7 6 10 12

64. A grocer bought 6 gallons of maple sirup put up in pint bottles; how many pint bottles of it did he buy?

65. How many yards are there in a rod? Cut a strong cord exactly a rod long. Measure it with a foot rule. How many feet long is it?

66. Frank's father sells 12-cent boxes of ice cream. How much did he receive for 4 gal. of ice cream sold in such boxes, if it takes 5 of these boxes to hold a quart?

67. A school gave an entertainment, charging 25 cents admission; 255 tickets were sold. The expenses were $27.50; how much money was made?

68. How many minute spaces does the minute hand of a clock pass over in $\frac{1}{2}$ of an hour? in $\frac{1}{4}$ of an hour? in $\frac{1}{6}$ of an hour?

69. A girl bought 3 eggs at 60 cents a dozen; what did she pay for them? Many persons remember when eggs cost 12 cents a dozen; what did 3 eggs cost then? What did 6 eggs cost?

70. When the thermometer registers 18°, how many degrees is the temperature below freezing point?

71. 4 lb. of beef will lose about 1 lb. 5 oz. in roasting; what should it weigh when roasted?

72. 10 eggs are estimated to weigh 1 lb.; at this estimate, what is the weight of 5 doz. eggs?

73. From a piece of cloth containing 20 yd., a merchant cut $2\frac{1}{2}$ yd. at one time and $3\frac{3}{4}$ yd. at another; how much remained?

74. How much money has a boy who has a $5 gold piece, a $1 bill, a half dollar, a nickel, and a cent?

75. How many cups of granulated sugar are there in 5 lb., counting $\frac{1}{2}$ lb. to the cup?

76. How many gallons of ice cream are needed to give each of the 110 children at a picnic one box of ice cream, if one gallon makes 20 boxes of ice cream?

77. Sam's father hired an automobile for 5 hours. How much did he pay if he was charged $2 for the first hour, $1.50 for the second, and $1 for each of the remaining hours?

78. A merchant gets change at a bank for $5, half in nickels and half in dimes; how many of each does he receive?

79. How many days are there in 52 weeks and 1 day?

80. What is the sum of the sides (the **perimeter**) of a 2-inch square?

81. State at sight the quotient and the remainder:

$$99\overline{)100} \qquad 498\overline{)500} \qquad 99\overline{)200} \qquad 999\overline{)1000}$$

82. Multiply the product of 3 and 2 by $1\frac{1}{2}$.

83. A cubic foot of ice is estimated to weigh 57 lb. Estimate the weight of a block of ice 3 ft. long, 2 ft. wide, and $1\frac{1}{2}$ ft. thick.

84. Find the cost of a cement walk 20 ft. long and 3 ft. wide at 30 cents a square foot.

85. Think of a number, multiply it by 4, add 6 to the product, divide this sum by 2, subtract 3 from the quotient, and then divide the remainder by 2. Compare your answer with the number you thought of. Try this with several numbers.

86. A merchant had on hand at the beginning of a day's sales $91.57. During the day he took in $119.28 and paid out $35.63; how much money had he on hand at the close of the day?

87. How many rods are there in a mile? How many yards are there in a rod? Multiply 320 by 5½. What does the answer tell you?

88. Name the months which have 30 days each; 31 days each.

89. The teacher has a box of three dozen pencils. Four boys sharpened them for her. If each boy sharpens the same number, how many does each sharpen?

90. Mr. Wood, the carpenter, is putting 5 pairs of hinges on some doors. He needs 8 screws for each hinge; how many screws does he need for the 5 pairs?

91. What does a family save by buying a ton of coal for $10.50 instead of buying it by the bucket at 30¢ a bucket, if 56 buckets of the size bought make a ton?

92. A dealer bought potatoes at $2.40 a bushel and retailed them at 40¢ a half peck. What was his gain on each bushel?

93. How many gallons are there in 4 barrels, counting $31\frac{1}{2}$ gal. to each barrel?

94. Find the amount of this threshing bill:

500 bu. of wheat at 6 ¢ a bushel
450 bu. of oats at 4 ¢ a bushel
60 bu. of rye at 6 ¢ a bushel

95. A common brick is 8 in. long, 4 in. wide, and 2 in. thick; how many cubic inches does it contain?

96. Find the cost of this standard Scout outfit:

Hat	$3.75
Coat	3.00
Breeches . . .	2.50
Cotton shirt . .	2.00
Leggins . . .	1.25
Belt	.50
Haversack . . .	2.65

97. Find the products; name as many as possible at sight:

1 × 1 × 1
2 × 2 × 2
3 × 3 × 3
4 × 4 × 4
5 × 5 × 5
6 × 6 × 6
7 × 7 × 7
8 × 8 × 8
9 × 9 × 9
10 × 10 × 10
11 × 11 × 11
12 × 12 × 12

98. Write four fractions that are each equal to $\frac{1}{2}$; four that are each less than $\frac{1}{2}$; four that are each greater than $\frac{1}{2}$.

99. A man bought a lot for $1600 and built upon it a house costing $7480. He sold them both for $11,000. How much money did he make?

100. Jane has saved $6.20. How much more does she need to pay for a hat costing $3.50 and a dress costing $5.25?

101. A man bought a farm for $33,000, paying $165 an acre. How many acres were there in the farm?

102. A stationer bought 8 dozen pencils at 42 cents a dozen and sold them at 5 cents apiece; how much money did he make?

103. How many points did a Boy Scout score in "homecraft" if he scored 20 points for promptness, 20 points for cheerfulness, 60 points for obedience, 40 points for helpfulness, and 60 points for industry?

104. Louise took her sister and two brothers to the park. They all took a ride on the merry-go-round and also a ride on the roller-coaster. A ride on the merry-go-round cost 5¢ and one on the roller-coaster cost 10¢. Louise paid for all the rides from a dollar bill. How much had she left?

When you have finished this book you should be able to:

1. **Write and read any number of seven figures or less.**
2. **Count by 1's, 2's, 3's, 4's, 5's and 10's.**
3. **Use Roman numerals correctly.**
4. **Add, subtract, multiply, and divide accurately, making good records (see page 262); also, check all work.**
5. **Know the common tables of measures and how to use them, as well as make fairly correct estimates involving these measures and test the accuracy of your estimates.**
6. **Add, subtract, and multiply easy fractions and find fractional parts of whole numbers.**
7. **Keep monthly accounts of the money you receive and the money you spend, showing how much you are saving.**
8. **Use what you have learned to solve an abundance and variety of problems such as are associated with your experience in home, school, and other activities.**

Reference Tables

Money

10 cents = 1 dime
10 dimes = 1 dollar
100 cents = 1 dollar
10 dollars = 1 eagle

Weight

16 ounces = 1 pound
100 pounds = 1 hundredweight
2000 pounds = 1 ton
2240 pounds = 1 long ton

Liquid Measure

4 gills = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon

Dry Measure

2 pints = 1 quart
8 quarts = 1 peck
4 pecks = 1 bushel

Time

60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
12 months = 1 year
365 days = 1 common year
366 days = 1 leap year

Length

12 inches = 1 foot
3 feet = 1 yard
$5\frac{1}{2}$ yards = 1 rod
320 rods = 1 mile

$$\left.\begin{array}{l}1760 \text{ yd.}\\ 5280 \text{ ft.}\end{array}\right\} = 1 \text{ mile}$$

Counting

12 units = 1 dozen
12 dozen = 1 gross
20 units = 1 score

Cubic Measure

1728 cubic inches = 1 cubic foot
27 cubic feet = 1 cubic yard

Area

144 square inches = 1 square foot
9 square feet = 1 square yard
$30\frac{1}{4}$ square yards = 1 square rod
160 square rods = 1 acre

INDEX

The numbers refer to pages. No attempt is made to index problems other than as they occur under the subjects listed. Details under those subjects are given in the table of contents.

Addition, 4, 25, 34, 72, 130, 132, 177
Angles, 249
Average, 150
Bills, 242
Cash Accounts, 232
Counting, 1, 17, 20, 22, 33, 70, 71, 260
Cube, 254
Difference, 13, 41
Direction, 90
Dividend, 191
Division, 51, 54, 57, 59, 96, 110, 136, 138, 140, 142, 144, 146, 148, 150, 152, 162, 190
Divisor, 191
Drawing to a Scale, 248
Dry Measures, 62, 121
Forming Numbers, 17, 31
Fractions, 205
General Review, 168–171, 261–272
Liquid Measures, 60, 120
Measures, 244–259
Measures of Length, 64, 124, 247
Measures of Surface, 249
Measures of Time, 244
Measures of Weight, 123, 258
Minuend, 41
Mixed Numbers, 208
Multiplicand, 186
Multiplier, 186
Multiplication, 49, 52, 55, 58, 92, 105, 135, 137, 139, 141, 143, 145, 147, 149, 159, 164, 167, 183
Multiplication Tables, 165
Plan of a Garden, 253
Product, 95, 186
Quotient, 96, 191
Reading and Writing Numbers, 1, 17, 31, 70, 172
Rectangle, 128, 252
Rectangular Solid, 257
Reference Tables, 273
Remainder, 13, 112, 192
Remark, 43, 81, 131, 202
Review, 23, 24, 30, 46–48, 69, 91, 99, 115–119, 133, 134, 165, 168–171, 201–204, 223–226, 239–241, 261–272
Roman Notation, 66, 84, 175
Square, 126, 249
Subtraction, 12, 28, 41, 72, 79, 131, 132, 180
Subtrahend, 41
Sum, 7
Tables, 49, 52, 55, 58, 60, 62, 84, 85, 92, 105, 120, 121, 124, 135, 137, 141, 143, 165, 173, 175, 227, 234, 245, 247, 251, 256, 258, 260, 273
Teacher, To the, 5, 10, 14, 15, 17, 19, 22, 25, 29, 30, 34, 38, 41, 43, 45, 47, 48, 49, 62, 70, 73, 74, 80, 89, 103, 104, 107, 112, 118, 120, 123, 125, 136, 144, 151, 177, 189, 191
Thrift, 45, 151, 238
Time, 67, 100, 103
United States Money, 85, 227
Weather Conditions, 104
Whole Numbers (Integers), 208
Zero, 7, 17

21.